Rochester Academy of Science
Fall 2011 Scientific Papers Day

Saturday, October 29, 2011

Hosted by:
Monroe County Community College and
the Departments of Biology, Chemistry and Geosciences,
and Engineering Science and Physics

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8:00 am	Registration	Gilman Lounge, Flynn Campus Center	
8:00 – 9:00 am	Coffee & Refreshments	Gilman Lounge, Flynn Campus Center	
9:00 – 11:00 am	Oral Presentations		
	Session I: Agriculture, Anthropology & New Approaches		12-209
	Session II: Phylogeny, Ecology & Paleontology		12-203
	Session III: Ecology		12-207
	Session IV: Meteorology, Physics & Astronomy		12-215
	Session V: Chemistry I		12-211
	Session VI: Chemistry II		12-213
11:00 am – 12:00 pm	Poster Session		Forum (3-130)
12:00 pm	Luncheon	Monroe A and B, Flynn Campus Center	
1:00 pm	Key Note Speaker	Monroe A and B, Flynn Campus Center	

Disappearing Ice! Mass Loss and Dynamics of the Greenland Ice Sheet
Dr. Beata Csatho
Department of Geology, University of Buffalo

Oral Presentations

Session I: Agriculture, Anthropology & New Approaches

Room 12-209

9:00 – 9:15 am	**A Qualitative Analysis of the New York Food and Agriculture Related Industry** Robert King
9:20 – 9:35 am	**The Use of Bio-Char in Native American Corn Hill Agriculture** Ali Ahmed
9:40 – 10:00 am	**"A Steppingstone Of Civilization": The Hojack Swing Bridge and Structures of Power in Monroe County** Kyle Somerville
10:00 – 10:15 am	**The Warrior Suitor Of Moki: A Look into 19th Century Zuni Culture Through Myth** Chris Keegan
10:20 – 10:35 am	**Coherent X-Ray Scattering from Surfaces** Michael S. Pierce
10:40 – 11:00 am	**Number Curves: A New Way to Do Arithmetic** David Nadeau

Oral Presentations

Session II: Phylogeny, Ecology & Paleontology

Room 12-203

9:00 – 9:15 am **Molecular Phylogenetic Reconstruction of the Neotropical Cucumber Genus *Gurania***
Adam Longwich

9:20 – 9:35 am **Effects of Light and Feeding on Growth of the Caribbean Coral *Acropora cervicornis***
Caresse Fernandez

9:40 – 10:00 am **Urea is a Dynamic Pool of Bioavailable Nitrogen in Coral Reefs**
Jesse Crandall

10:00 – 10:15 am **Clustering of Disarticulated Remains of Large Vertebrates at the Hiscock Site**
Michael R. Grenier

10:20 – 10:35 am **Description of a Juvenile Specimen of *Deinonychu antirrhopus* (Theropod, Dromaeosauridae) with Comments on Ontogenetic Variable Characteristics**
Bill Parsons and Kris Parsons

10:40 – 11:00 am **Aggregation Pheromones of Isopods**
Michelle Tabisz

Oral Presentations

Session III: Ecology

Room 12-207

9:00 – 9:15 am	**Macrophyte Surveys for Hemlock and Canadice Lakes** Bruce Gilman
9:20 – 9:35 am	**Black Bear Trails and Sign: A Preliminary Study** Alyssa Johnson
9:40 – 10:00 am	**The Influence of Watershed Landuse on the Composition of Dissolved Organic Matter Entering Conesus Lake, New York** Morgan Bida
10:00 – 10:15 am	**Characterizing Wetland Vegetation Using Hyperspectral Imagery** Nicole Dutcher
10:20 – 10:35 am	**Value of Native and Invasive Fruit-bearing Shrubs for Migrating Songbirds** Samantha Desando
10:40 – 11:00 am	**Heavy Metal Avoidance Behavior in Terrestrial Isopods** Harshita Sood

Oral Presentations

Session IV: Meteorology, Physics & Astronomy

Room 12-215

9:00 – 9:15 am **Frequency and Characteristics of Lake Breeze Circulations in the Great Lakes Region**
Neil Laird

9:20 – 9:35 am **Modeling Frost Line Soil Penetration Using Freezing Degree-Day Rates, Day Length, and Sun Angle**
Jack W. Kanack

9:40 – 10:00 am **The Effect of Lake Michigan on Mature Mesoscale Convective Systems**
Nicholas Metz

10:00 – 10:15 am **Investigation of the Low ν Method to Determine Neutrino Flux at Low Energies**
Ulascan Sarica

10:20 – 10:35 am **A Spitzer View of the Giant Molecular Cloud Mon OB1/NGC 2264**
Valerie Rapson

10:40 – 11:00 am **Planetary Eccentricity Increase With Distance and Time**
Ingo H. Leubner

Oral Presentations

Session V: Chemistry I

Room 12-211

9:00 – 9:15 am **The Photoprotective Properties of Vitamin D3: A Biochemical Study of Vitamin D Uptake by *Daphnia* (Microcrustacean)**
Kelly Walling

9:20 – 9:35 am **Cage Opening/Rearrangements of Iodinized Cubane Derivatives**
Christopher Dietz

9:40 – 10:00 am **Why Is There Much Scatter in Published Data for Surface Tension and Critical Aggregation Concentration in Aqueous Solutions**
Markus Hoffmann

10:00 – 10:15 am **Investigation of the Lewis Acid Catalytic Abilities of Tungsten (IV) Compounds on the Esterification of Fatty Acids**
Molly Kingsley

10:20 – 10:35 am **NMR Characterization and Mechanistic Implications of Singlet Oxygen Addition to the Vitamin B_6 Ring**
David Samuel

10:40 – 11:00 am **Pseudo-Polyelectrolytes: Multilayers and Applications**
Ronny Priefer

Oral Presentations

Session VI: Chemistry II

Room 12-213

9:00 – 9:15 am	**Localization of Melanin-Concentrating Hormone Receptor 1 to Caveolae Can Be Modulated by Overexpression of Arrestins** Laurie Cook
9:20 – 9:35 am	**Prevallence of Epithelial to Mesochymal Transition, (Emt) Resultring from Ultrapotent corticosteroid treatment of Vulvar Disease** Jani Lewis
9:40 – 10:00 am	BREAK
10:00 – 10:15 am	**Glycerol, A Byproduct of the Biodiesel Industry** James P. Nakas
10:20 – 10:35 am	**Tin (II) Halides As Catalysts for the Esterification of Biodiesel** James Chambers

Poster Presentations

(Listed Alphebetically by First Author's Last Name)

HYDROCARBON DEGRADING BACTERIA ISOLATED FROM A PINE STAND IN MENDON PONDS, MENDON, NY

Mohd Nico Abel and Dr. Jeff Lodge
Rochester Institute of Technology, School of Life Sciences, Rochester, NY 14623

DO RECENTLY METAMORPHOSED AMERICAN TOADS (*BUFO AMERICANUS*) RESPOND TO CHEMICAL STIMULI FROM VERTEBRATE AND INVERTEBRATE PREDATORS?

Michele M. Adams, Maya M. McElfish, and Aaron M. Sullivan
Houghton College, Department of Biology, Houghton, NY 14744

CHARACTERIZATION OF *STAPHYLOCOCCI* ISOLATED FORM WHITE-TAIL DEER

Susana Agudelo-Uribe, Mary Gallo, Patrick Teixeira, Mark Gallo, Ph. D
Niagara University, NY 14109, USA

A MICRORNA SCREEN FOR NOVEL EUKARYOTIC FLAGELLAR MOTILITY PROTEINS

Noveera Ahmed[1], Beth Ferro Mitchell[2]
[1]*St. John Fisher College, Department of Biology, 3690 East Avenue, Rochester, NY 14618*
[2]*Le Moyne College, Department of Biological Sciences, 1419 Salt Springs Road, Syracuse, NY 13214*

TEMPERATURE DEPENDENCE OF SELF-ASSEMBLY OF AMYLOID BETA PEPTIDE AT NANOSCALE GOLD COLLOIDAL SURFACE

Michael Annese, Giang Nguyen, Queeny Pan
SUNY Geneseo, 10 MacVittie Circle, Geneseo, NY 14454

STABLE OPTICAL LIFT

Alexandra Artusio-Glimpse, Grover Swartzlande, Tim Peterson, and Alan Raisanen
Rochester Institute of Technology, Carlson Center for Imaging Science, Rochester NY 14623

SCREENING OF TRANSPOSON MUTANTS OF SPHINGOBIUM SP. KK22 ALTERED IN QUORUM-SENSING SIGNAL SYNTHESIS

Nazrin Abd Aziz and Michael A. Savka
Rochester Institute of Technology, School of Life Sciences, 85 Lomb Memorial Dr., A350 Gosnell Hall, Rochester, New York 14623

SURFACE EVOLUTION AND RETREAT PATTERNS OF THE NORTHWEST GREENLAND ICE SHEET: A MULTITEMPORAL, MULTISENSOR APPROACH TO UNDERSTANDING DYNAMIC GLACIER BEHAVIOR

Greg Babonis[1], Bea Csatho[1], Toni Schenk[1], Cornelis van der Veen[2]
[1]*SUNY at Buffalo, 411 Cooke Hall, Buffalo, NY 14260*
[2]*University of Kansas, 203 Lindley Hall, Lawrence, KS 66045*

CED-3 MUTANT *CAENORHABDITIS ELEGANS* DEMONSTRATE A DECREASED AMOUNT OF APOPTOSIS WITHIN THE GONAD

Katelyn Barnhart and Joan E. Magnusen
Keuka College, 141 Central Avenue, Keuka Park, NY 14478

THE INVESTIGATION OF TIN(II) FLUORIDE AS A LEWIS ACID CATALYST FOR BIODIESEL PRODUCTION

Emily Benton and Richard Hartmann
PO Box 65 Nazareth College, Chemistry Department, 4245 East Ave Rochester, NY 14618

CREATING HIGH RESOLUTION IMAGES FOR ENHANCED UNDERSTANDING OF BIOLOGICAL ORGANISMS

Erika Bliss[1], Kaitlyn Rubin[2], Dina Newman[3], Karen Evans[4], Jeff Pelz[4]
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[2] Rochester Institute of Technology ,School of Photographic Arts and Sciences, One Lomb Memorial Drive, Rochester, NY 14623
[3] Rochester Institute of Technology School of Life Sciences, One Lomb Memorial Drive, Rochester, NY 14623
[4] Center for Imaging Science, Rochester Institute of Technology, One Lomb Memorial Drive, Rochester, NY 14623

INVASIVE PLANTS SURVEY AT HIGH ACRES NATURE AREA, PERINTON, NY

Kathryn Boa[1], Lisa Kratzer [1], Matt Paufve [2], Christy Tyler [1]
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[2]Monroe Community College, Biology Department, 1000 East Henrietta Road, Rochester, NY 14623

A STUDY OF POWER GENERATION USING FERROMAGNETIC LIQUIDS

Rory Burke and Adrian Ieta
State University of New York at Oswego, Department of Physics, NY, USA

EXPERIMENTAL STUDY OF BROWN-BIEFELD EFFECT

Rory Burke, Christopher Wahl, Gabriella Medina, Tajia Rae Thurston, and Adrian Ieta
State University of New York at Oswego, Department of Physics, NY, USA

METHYLATION OF PHENOLS WITH DMF-DMA USING A LABORATORY MICROWAVE

Veronica L. Campanella, Pavel Belov, Alison W. Smith, Ronny Priefer
Niagara University, Department of Chemistry, Biochemistry, and Physics, NY 14109, USA

STUDIES TOWARD THE TOTAL SYNTHESIS OF TROCHELIOPHOROLIDE A

Anthony Carestia, Jennifer Swartzenberg, Stephanie Dorn, Jessica Smith, Moni Augusto, William Spencer and Dr. Christina Collison
Rochester Institute of Technology, 85 Lomb Memorial Drive, Rochester, NY 14623

HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC) ANALYSIS OF VITAMIN D_3 IN ALGAE SAMPLES

Joy Valerie Carrera, Diane Catlin, Dr. Loraine Tan, Dr. Sandra Connelly, Dr. Jeremy Cody, Kelly Walling, Stephanie Bowles
Rochester Institute of Technology, 85 Lomb Memorial Drive, Rochester, NY 14623

DEVELOPING MICROPLATE ASSAYS FOR MCH SIGNALING

Robert T. Carroll and Laurie B. Cook.
The College at Brockport, State University of New York, 217 Lennon Hall, 350 New Campus Drive, Brockport, NY 14420

SYNTHESIS AND CHARACTERIZATION OF NOVEL ORGANOSILICON COMPLEXES
Daniel P. Caruso, William W. Brennessel, Bradley M. Kraft
St. John Fisher College, Department of Chemistry, 3690 East Avenue, Rochester, NY 14618
University of Rochester, Rochester, NY 14627

FACULTY AND TEXTBOOK ASSUMPTIONS OF STUDENT KNOWLEDGE THAT AFFECT LEARNING THE CONCEPTS OF MEIOSIS
Christina Catavero, L. Kate Wright, Dina L. Newman
Rochester Institute of Technology; School of Life Sciences; 153 Lomb Memorial Dr.; Rochester, NY 14623

THE USE OF MICROSATELLITES AS A MEANS TO STUDY THE POPULATION STRUCTURE OF THE EASTERN HELLBENDER SALAMANDER, *CRYPTOBRANCHUS ALLEGANIENSIS ALLEGANIENSIS*
Sarah Chudyk
Buffalo State College, 1300 Elmwood Avenue, Buffalo, NY 14222

INDUCING APOPTOSIS: A KINETIC STUDY COMPARING TIME AND CONCENTRATION OF STAUROSPORINE AND OKADAIC ACID ON HELA AND MCF10A CELLS
Lisa Chute and Robert S. Greene Ph.D.
Niagara University, Academic Center for Integrated Science, Department of Biology, NY 14109

SEISMITE/TSUNAMIITE IN EURYPTERID-BEARING BEDS OF THE LATE SILURIAN BERTIE GROUP, NEW YORK AND ONTARIO, CANADA
Samuel J. Ciurca, Jr.
P.O. Box 10311, Rochester, New York 14610

STRATIGRAPHIC STUDIES ALONG THE ONONDAGA ESCARPMENT – THE LATE SILURIAN BERTIE GROUP IN WESTERN NEW YORK
Samuel J. Ciurca, Jr. and Mark Wade

ANALYSIS OF BIOCHEMICAL MARKERS AND THEIR RELATIONSHIP TO RISK OF DEVELOPING CORONARY ARTERY DISEASE
Cory Clugston, Christopher S. Stoj
Niagara University, Department of Chemistry, Biochemistry and Physics, Niagara University, NY 14109

AN INVESTIGATION OF PHOSPHORYLATION OF A SPLICING FACTOR, SR45, IN ARABIDOPSIS THALIANA
Sinead Coleman, Jason Chien, Xiao-Ning Zhang
St Bonaventure University, Department of Biology, St Bonaventure, NY 14778

THE ROLE OF RAD52P ISOFORMS IN DIRECT REPEAT-MEDIATED DELETION EVENTS
Bridget Cooney, Melissa Colon, Laura Pankowski, Kyle Walker, and Rey Sia
The College at Brockport – State University of New York, Department of Biology, 350 New Campus Dr., Brockport, NY 14420

NON-HYDROLYTIC SOL-GEL SYNTHESIS AND CHARACTERIZATION OF $Ce_xHf_{1-x}O_2$ NANOCRYSTALS
Nicholas D. Cultrara, Sean W. Depner, and Sarbajit Banerjee
University at Buffalo, State University of New York, Department of Chemistry, Buffalo, NY 14260-3000

DO AGE, SEX AND SIZE INFLUENCE THE LENGTH OF STRAY DOGS AT NO-KILL SHELTERS IN NEW YORK?
Janelle Davidson, William Brown, Marion Zuefle
Keuka College, 141 Central Ave, Keuka Park NY, 14478

BIOFILMS PROTECT *CRYPTOSPORIDIUM PARVUM* OOCYSTS AGAINST INFECTIVITY LOSSES FROM SOLAR RADIATION EXPOSURE
Elizabeth Wolyniak DiCesare[1], Bruce Hargreaves, Kristen Jellison[2]
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MYCORRHIZAE DISTRIBUTIONS BY DEPTH IN NORTHERN HARDWOOD ECOSYSTEMS
Franklin Diggs, Ruth Yanai, Thomas Horton
SUNY College for Environmental Science and Forestry, 1 Forestry Drive, Syracuse, NY 13210-2788

BELOWGROUND PRODUCTIVITY OF HYBRID CATTAIL (*TYPHA* X *GLAUCA*) AND PURPLE LOOSESTRIFE (*LYTHRUM SALICARIA*) IN A CENTRAL NEW YORK MARSH
M. Josh Dranoff, Melissa Maurer, Daniel Labuz, C. Eric Hellquist
State University of New York at Oswego, Department of Biological Sciences, 316 Snygg Hall, Oswego, NY 13126

DREISSENID MUSSEL INVASION, COLONIZATION AND IMPACTS TO THE NUTRIENT BUDGET OF CANANDIAGUA LAKE
Sarah N. Dresson, Paul J. Mysliwizc, Don B. Slentz, Kevin L. Olvany, Bruce A. Gilman
Finger Lakes Community College, Department of Environmental Conservation and Horticulture, 3325 Marvin Sands Drive, Canandaigua, New York 14424

GENETIC DIFFERENTIATION OF COMMON LOONS (*GAVIA IMMER*) FROM TWO REGIONS IN CANADA
Niamh Durfee, Amy McMillan
Buffalo State College, 1300 Elmwood Ave., Buffalo, NY 14222

NMR MICROSCOPY: APPLICATIONS IN BOTONY
Elaine Ferrara, Sarah Paluskiewicz, Joseph P. Hornak
Rochester Institute of Technology, Magnetic Resonance Laboratory, Center for Imaging Science, 54 Lomb Memorial Drive, Rochester, NY 14623-5604

MULTI LOCUS SEQUENCE TYPING ANALYSIS OF *STAPHYLOCOCCUS* ISOLATES FROM WHITE TAILED DEER
Kristina Foderaro[1] and Mark A. Gallo, Ph.D[2].
[1]PO Box 0306, Niagara University, NY 14109-0306
[2]DePaul Hall, Niagara University, NY 14109

EXPRESSION OF FACT IN MAMMALIAN TISSUES SUGGESTS ITS ROLE IN MAINTAINING OF UNDIFFERENTIATED STATE OF CELLS
Henry Garcia, Daria Fleyshman, Kateryna Kolesnikova, Alfiya Safina, Mairead Commane, Geraldine Paszkiewicz, Angela Omelian, Carl Morrison, Katerina Gurova
Roswell Park Cancer Institute, CPU Box 275415, Buffalo, NY 14263

RESEARCH OPPORTUNITIES AT THE MULLER FIELD STATION OF FINGER LAKES COMMUNITY COLLEGE
Bruce A. Gilman and Sasha J. MacKenzie
Finger Lakes Community College, Department of Environmental Conservation and Horticulture, 3325 Marvin Sands Drive, Canandaigua, New York 14424

REEF BUILDING CORALS RELY ON SYMBIONTS FOR ENERGY AND NUTRIENTS OVER A LARGE DEPTH RANGE
Kristen Gloeckler[1], Mark Teece[1], Diego Lirman[2]
[1] SUNY College of Environmental Science and Forestry 1 Forestry Drive Syracuse, NY 13210
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MELANIN-CONCENTRATING HORMONE RECEPTOR 1 PROTEIN LEVELS INCREASE WITH LONG-TERM MCH TREATMENT IN TRANSFECTED BHK CELLS
Andrew Goodspeed and Laurie B. Cook
The College at Brockport, State University of New York, 217 Lennon Hall, 350 New Campus Drive, Brockport, NY 14420

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Katrina M. Haude and Laurie B. Cook
The College at Brockport, State University of New York, 217 Lennon Hall, 350 New Campus Drive, Brockport, NY 14420

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Jay-Christian P. Helt, Emily R. Wexler, Ben I. Turkovitz, and Huey Hing
The College at Brockport, Department of Biological Sciences, Lennon Hall, Room 204B, 350 New Campus Drive, Brockport, NY 14420

GENERATING INTEREST IN PLANT BIOLOGY AMONG PREDOMINANTLY PRE-MED UNDERGRADUATES USING A POPULAR SCIENCE NOVEL
Maryann A.B. Herman
St. John Fisher College, 3690 East Avenue, Rochester, NY 14618

INFLUENCE OF WOODY PLANT ABUNDANCE ON THE RESPONSE OF SOIL MICROBIAL RESPIRATION TO PLANT ROOT EXUDATES
Torri Ivancic and Daniel Potts
Buffalo State College, 1300 Elmwood Avenue, Buffalo, NY 14222

A 3-DIMENSIONAL ANGIOGENESIS ASSAY USING CALF PULMONARY ARTERY ENDOTHELIAL (CPAE) CELLS GROWN ON GELTREX
Nur Sabrina Kamarulzaman, Siti Fatimah Sabran, Wahidatul Husna Zuldin and Irene M. Evans
Rochester Institute of Technology, School of Life Sciences, 85 Lomb Memorial Drive, Rochester, NY 14623

PALLADIUM CATALYZED REACTIONS: A SEARCH FOR A GREENER OXIDATION PATHWAY
Yoon-Kook Kim, Shannon Hritz, and Karen E. Torraca
Houghton College, Department of Chemistry, 1 Willard Avenue, Houghton, NY 14744

PHYLOGEOGRAPHIC STUDY OF CTENOSAURA SIMILIS

Zoe Kostarellis [1], Kevin Keller [1], Larry Buckley [1], Stesha Pasachnik [2]
[1]*Rochester Institute of Technology, School of Life Sciences, Rochester, NY 14623*
[2]*Fundación Islas de la Bahía, Honduras*

CLU1P REGULATES MITOCHONDRIAL MORPHOLOGY AND MITOCHONDRIAL DNA STABILITY

Luke Krembs and Rey A. Sia
The College at Brockport, State University of New York, Department of Biology, 350 New Campus Dr., Brockport, NY 14420

SYNTHESIZING OXIDATION-RESISTANT LIGANDS FOR C-H AMINATION CATALYSTS

Sarah Kruidenier [1], Dr. Patrick Holland [2], Dr. Brian Edelbach [3], Sarina Bellows [2]
[1]*SUNY Geneseo College, 10 MacVittie Dr, Geneseo, NY 14454*
[2]*University of Rochester, Department of Chemistry, Rochester, NY 14623*
[3]*Monroe Community College, Department of Chemistry and Geosciences, Rochester, NY 14623*

SPATIOTEMPORAL VARIATION IN FATTY ACID SIGNATURES OF LAKE MICHIGAN SPOTTAIL SHINER *Notropis hudsonius*

Josh LaFountain[1], Jacques Rinchard[1], Sergiusz Czesny[2], Tomas Höök[3], Gabriel Bowen[4], John Janssen[5], Harvey Bootsma[5]
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[2]*Illinois Natural History Survey, University of Illinois, 400 17th Street, Zion, IL 60099*
[3]*Department of Forestry and Natural Resources, Purdue University, 195 Marsteller Drive, West Lafayette, IN 47907*
[4]*Department of Earth and Atmospheric Sciences, Purdue University, 550 Stadium Mall Drive, West Lafayette, IN 47907;* [5]*Great Lakes Water Institute, University of Wisconsin-Milwaukee, 600 E. Greenfield Avenue, Milwaukee, WI 53204*

METHYL ESTER PRODUCTION OF OLEIC ACID CATALYZED BY TIN(II) BROMIDE

Briana Laubacker
Nazareth College, Department of Chemistry, Rochester, NY 14618

FERROXIDASE ACTIVITY OF THE MULTICOPPER OXIDASE FET5 FROM S. CEREVISIAE

AnneMarie Laurri, Amanda Oldacre, Juliana Sledziewski, Shella Dargout, Christopher S. Stoj
Niagara University, Department of Biochemistry, Chemistry, and Physics, Niagara Falls, NY 14109

POSSIBLE TREATMENT OF TYPE II DIABETES USING *S*-SUBSTITUTED-*N,N*-DIMETHYLDITHIOCARBONATES

John Leistner**,** Christopher Stoj, Ronny Priefer
Niagara University, Department of Chemistry, Biochemistry, and Physics, NY 14109

GLUTATHIONE PEROXIDASE AS A RISK FACTOR IN CORONARY ARTERY DISEASE

Deborah A. Leonard[1], Mary C. Gallo[1], Michael Merhige[2]
[1]*Biology Department, Niagara University, Academic Center for Integrated Sciences, Niagara University, NY 14109.*
[2]*The Heart Center of Niagara, 571 Tenth St. Niagara Falls, NY 14302*

MULTIDIMENSIONAL FLUORSCENCE AND CHEMOMETRIC ANALYSIS OF THE PHENOLIC CONTENT OF HUMIC MATERIAL

James Macisco, Ryan Spector, Morgan Bida, Annemarie D. Ross, Susan B. Smith, A. Christy Tyler, and Todd Pagano
Rochester Institute of Technology, Laboratory Science Technology Program, National Technical Institute for the Deaf, 52 Lomb Memorial Drive, Rochester, NY 14623-5603

DETERMINATION OF THE EFFECTS OF ENDOSULFAN-ALPHA ON TRANSCRIPTS KNOWN TO REGULATE PRIMORDIAL GERM CELL MIGRATION IN ZEBRAFISH

Jessica Marks, Ryan McKelvie, Stephanie Woltz, and Edward Freeman, PhD.
St. John Fisher College, Department of Biology, 3690 East Avenue, Rochester, NY 14618

IDENTIFICATION AND CHARACTERIZATION OF L,L-DIAMINOPIMELATE AMINOTRANSFERASE (DAPL) IN *VERRUCOMICROBIUM SPINOSUM* DSM 4136

Victoria Nachar and André O. Hudson
Rochester Institute of Technology, Department of Biological Science, 85 Lomb Memorial Dr. Rochester, NY 14623

ESTERIFICATION OF FREE FATTY ACIDS IN OLEIC ACID FOR BIODIESEL SYNTHESIS USING LEWIS ACID TIN (II) IODIDE

Kristin Nichols
Nazareth College, Department of Chemistry, Rochester, NY 14618

CHO-K1 CELL EXPOSURE TO 'ENVIRONMENTALLY SAFE' SIMPLE GREEN AND 2-BUTOXYETHANOL HAS AN ALARMING EFFECT IN CELL VIABILITY

Austin Olek, Matthew Morasco, Casey Donovan, Andrew Goodspeed and Laurie B. Cook
The College at Brockport, State University of New York, Department of Biology Sciences, , 217 Lennon Hall, 350 New Campus Drive, Brockport, NY 14420

DIMERIZATION OF BENZYLAMINE WITH SULFUR MONOCHLORIDE

Bryce Paolella and Ronny Priefer
Niagara University, Department of Chemistry, Biochemistry, and Physics, NY 14109

SYNTHESIS OF ISOFLAVONE DERIVATIVES USING A NOVEL METHODOLOGY

James M. Papia, Kyle F. Biegasiewicz, and Ronny Priefer
Niagara University, Department of Chemistry, Biochemistry, and Physics, NY 14109

TRANSCRIPTIONAL PROFILING OF [PSI+] CELLS UNDER STRESSFUL ENVIRONMENTAL CONDITIONS

Prashanti Patil, Jacqualyn Schulman, Margaret Barlow, Thomas Di Benedetto, Brandy L. Dennis, Irene M. Evans
Rochester Institute of Technology, School Of Life Sciences, Rochester, NY 14623

SEQUENCE AND CHARACTERIZATION OF THE MANDUCA SEXTA NADPH TRANSHYDROGENASE

Matthew Pelletier, Laura Leigh French, Stephen Trinidad, and Kurt Vandock
Houghton College, Department of Biology, One Willard Avenue, Houghton, NY 14744

ILLUSTRATED KEY TO THE ISOPODS OF NEW YORK
Lydia Perkins, F. Harvey Pough
Rochester Institute of Technology, School of Life Sciences, Rochester, NY 14623

A STUDY OF THE ATMOSPHERIC COMPONENTS OF A WETLAND'S WATER BUDGET: WOODLAWN BEACH STATE PARK, NEW YORK.
Joseph Petre and Stephen Vermette
Buffalo State College, Department of Geography and Planning, 1300 Elmwood Avenue, Buffalo, NY 14222

RATES OF DEUTERIUM EXCHANGE OF AN ACIDIC C-H SULFONE
Maddison Pollina, James Papia, and Ronny Priefer
Department of Chemistry, Biochemistry, and Physics, Niagara University, NY 14109, USA

TRANSITORY REGIME OF FERROFLUID ELECTROSPRAYS
Dennis Quill, Joshua Primrose, Christopher Wahl, and Adrian Ieta
State University of New York at Oswego, Department of Physics, NY

THE DETERMINATION OF THE MICROENVIRONMENT WITHIN A BIODEGRADABLE POLYMER FILM USING COUMARIN C153
K. Rappaport, L. Tan, E. Carroll, L. Vernarelli
Rochester Institute of Technology, Department of Chemistry, 85 Lomb Memorial Drive, Rochester, NY 14623

NOVEL PSEUDO-POLYELECTROLYTES IN MULTILAYERED THIN FILMS
Chelsea Recor, Maria Albano, and Ronny Priefer
Niagara University, Department of Chemistry, Biochemistry, and Physics, NY 14109

PH AND TEMPERATURE DEPENDENCE OF DIFFUSION THROUGH A SOL-GEL MATRIX: A STUDY UTILIZING ETHYL-VIOLET DYE REVERSIBILITY
Jisu Ryu, Jocelin Kalish, Dan Mark, Kazushige Yokoyama
SUNY Geneseo, Department of Chemistry, Geneseo, NY 14454

TEMPERATURE AND pH DEPENDENCE OF DIFFUSION THROUGH A SOL-GEL MATRIX; A STUDY UTILIZING ETHYL-VIOLET DYD REVERSIBILITY
Jisu Ryu, Kazushige Yokoyama, Dan J Mark, Jocelin M Kalish
SUNY Geneseo, Department of Chemistry, Geneseo, NY 14454

COMPARISON OF METHODS DETERMINING NITRATE CONCENTRATION IN STREAM WATER
Jessica Saville[1], Colleen Bronner[2], Alan Rabideau[3]
[1]Nazareth College Box 1085, 4245 East Ave, Rochester NY 14618
[2]University at Buffalo, 204 Jarvis Hall, Buffalo, NY 14260; [3]University at Buffalo, 202 Jarvis Hall, Buffalo, NY 14260

ANALYSIS OF CYTOTOXICITY IN HEPG2 CELLS
Robert Scardino, Christopher S. Stoj
Niagara University, Department of Biochemistry, Chemistry, and Physics, Niagara Falls, NY 14109

ION-PAIRING OF THE IONIC LIQUID 1-HEXYL-3-METHYLIMIDAZOLIUM BIS(TRIFYL)AMIDE IN CHLOROFORM

Nathan Scharf, Markus Hoffmann
The College at Brockport, Department of Chemistry, 350 New Campus Drive, Brockport, NY 14420

WATER QUALITY ASSESSMENT OF TWENTY-EIGHT STREAMS IN THE CATSKILLS BASED ON BENTHIC MACROINVERTEBRATES

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MACROPHAGE APOPTOSIS IN ADVANCED ATHEROSCLEROTIC LESIONS INDUCED BY 7-KETOCHOLESTEROL AND IRON ASCORBATE

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NITROGEN AND PHOSPHORUS RESORPTION EFFICIENCY RATIOS VARY WITH STAND AGE IN NORTHERN HARDWOODS

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DISRUPTION OF BACTERIAL SIGNALING BY BEEHIVE PLANT RESINS

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SURVEY OF BACTERIA IN LAKE ONTARIO

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PUTTING ZEBRA MUSSELS TO THE TEST. CAN THIS INVASIVE SPECIES BE EXPLOITED FOR GOOD?

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THERMOLYTIC FRAGMENTATION OF SUBSTITUTED DIBENZYLOXY DISULFIDES

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STEROLS AS MOLECULAR BIOMARKERS FOR FEEDING STRATEGIES IN REEF BUILDING SCLERACTINIAN CORALS

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FOOD NUTRITION IMPACTS FITNESS OF *DAPHNIA* SPP. (FRESHWATER MICROCRUSTACEAN) EXPOSED TO ACUTE UV-A (320 – 400NM) RADIATION

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SELF ASSEMBLY OF AMYLOID BETA PEPTIDE OVER DISULFIDE FUNCTIONALIZED NANO GOLD COLLOIDAL PARTICLES

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EYE-TRACKING NOVICE AND EXPERT GEOLOGIST GROUPS IN THE FIELD AND LABORATORY

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EVALUATION OF ENDOTOXIN REMOVAL TECHNOLOGIES

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DETECTING PATHOGEN POPULATIONS IN THE RHIZOSPHERE COMMUNITIES OF TOMATO PLANTS

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ANALYSIS OF DRINKING WATER FOR TRIHALOMETHANES BY MEMBRANE- INTRODUCTION-GC-MS

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BIOMONITORING OF ELLICOTT CREEK

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INHIBITION TESTING OF *PSEUDOMONAS* SPP. "K/W" AGAINST *PYTHIUM APHANADURAMTUM* PA5 ON *CUCUMIS SATIVUS*

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ECOSYSTEM BUDGETS HAVE NO ERROR: A PROGRESS REPORT ON QUANTIFYING UNCERTAINTY IN FOREST ECOSYSTEM STUDIES (QUEST)

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ELECTRON MICROSCOPY STUDY OF THE AMYLOID BETA PROTEIN ON THE SURFACE OF COLLOIDAL NANOPARTICLES

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THE IMPACT OF THE LIGAND ON PALLADIUM-CATALYZED HYDRODECHLORINATION OF ARYL CHLORIDES

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USE OF MIRCROWAVE IRRIADIATION AND SOLID SUPPORT REAGENTS IN FRIEDEL-CRAFT ALKYLATION REACTIONS

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All Abstracts

(Listed Alphabetically by First Author's Last Name)

HYDROCARBON DEGRADING BACTERIA ISOLATED FROM A PINE STAND IN MENDON PONDS, MENDON, NY

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Two bacterial isolates were found that can degrade various hydrocarbons by enriching soil samples from a pine stand in Mendon, NY with a mixture of medium chain length alkanes, gasoline, and motor oil. The isolates PF1 and PF2 degraded various hydrocarbons such as medium chain length alkanes, an alkane mix, motor oil mix, CIMS organic mix, and biodiesel fuel. PF1 and PF2 can degrade a hydrocarbon mixture over a broad range of oxygen concentrations with the best degradation occurring at high aeration rates. PF1 and PF2 could degrade hydrocarbons when grown in different environmental conditions/media including water from Canandaigua Lake and Slater creek water and sediments. The ability to degrade hydrocarbons under a variety of environmental conditions may be important when developing a commercial blend of bacteria for use at contaminated sites.

DO RECENTLY METAMORPHOSED AMERICAN TOADS (*BUFO AMERICANUS*) RESPOND TO CHEMICAL STIMULI FROM VERTEBRATE AND INVERTEBRATE PREDATORS?

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Many vertebrate species use chemical cues from predators or injured conspecifics to evaluate predation risk. Chemoreception offers advantages as chemicals may persist after a predator has left an area and may be effective in small quantities or when visual cues are limited. Our study attempted to evaluate the chemically-mediated behavior of newly metamorphosed American toads (*Bufo americanus*) exposed to the chemical stimuli from four potential predators: fishing spiders (*Dolomedes sp.*), ring-necked snakes (*Diadophis punctatus*), and garter snakes (*Thamnophis sirtalis*). We asked four questions with our study: 1) Do toads alter their activity when exposed to chemical cues from predators? 2) Is toad activity correlated with body size? 3) Do toads avoid substrates soiled with the chemical stimuli from invertebrate and vertebrate predators? 4) Will groups of toads alter their spacing patterns in the presence of predator chemical cues? To evaluate activity, we conducted trials in petri dishes whose lids were visually divided into quadrants and we recorded the number of times that toads moved between quadrants. At the conclusion of the 15-min trial, the total length of each toad was measured. To determine if toads would avoid substrates containing predator cues, we placed two semi-circles of filter paper within petri dishes, one receiving the control and the other a predator cue, and we tallied the amount of time spent on each. To observe how toad cohesion was affected by the presence of predator cues, three toads were placed in petri dishes and the average distance between toads and the center of the triangle formed by their bodies was calculated after 10 minutes. Our data suggest that recently metamorphosed *B*. *americanus* do not respond chemical cues from predatory *Dolomedes*, *Thamnophis* or *Diadophis* by altering their activity, avoiding substrates containing chemical cues, or increasing the cohesiveness of their groups in the laboratory setting. In addition, toad activity does not appear to be correlated with body size in the presence of the different predator cues. Because earlier studies suggest that toads respond more effectively to visual cues during the day, a series of experiments similar to these, but performed at night or in the absence of visual stimuli, may reveal interesting aspects of the chemically-mediated predator-prey interactions.

CHARACTERIZATION OF *STAPHYLOCOCCI* ISOLATED FORM WHITE-TAIL DEER

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Staphylococci are common inhabitants of warm blooded mammals. One species in particular *S. aureus* is known to be a pathogen. Antibiotic resistance has become a big concern regarding this bacterium in the clinical and agricultural settings. This investigation addresses the level and diversity of antibiotic resistance in *Staphylococci* isolated from white-tail deer, *Odocoileus virginianus*.

THE USE OF BIO-CHAR IN NATIVE AMERICAN CORN HILL AGRICULTURE

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Recent discoveries indicate that as much as 30% of the land mass in the Amazon River Basin in South American may consist of human created soils that were part of an agricultural system prior to the arrival of Europeans on the continent. An important component found in these Terra Preta, or dark earth soils, is the amendment of anthropogenic carbon known as bio-char. Bio-char has recently been the focus of an increasing number of studies because of its possible use for increasing agricultural production, soil remediation, and carbon sequestration. Growing corn on small human-constructed hills in multi-species planting arrangements is a documented Native American agricultural practice in North America known as Three Sisters gardening. We found anecdotal references that indicate the possible historical use of bio-char in North American corn hill agriculture. We performed an experiment to test for benefits of incorporating bio-char in corn hills on the Rochester Institute of Technology's campus. We found significantly greater plant growth and corn production on corn hills that had bio-char compared with our control plantings. This study provides evidence for the possibility that bio-char may have been a much more important component of historical Native North American agriculture than previously thought.

A MICRORNA SCREEN FOR NOVEL EUKARYOTIC FLAGELLAR MOTILITY PROTEINS

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Motile flagella and cilia are highly conserved organelles found in all branches of eukaryotic life. The characteristic internal structure includes two rows of motor proteins, the inner and outer dynein arms, attached to 9 outer doublet microtubules. The dynein arms are large ATPase protein complexes which drive flagellar movement. Previous studies of these protein complexes shows that cytoplasmic factors are required for both their correct assembly from component polypeptides and their targeting/transport to the proper flagellar location. We have begun looking for novel dynein assembly factors using artificial microRNAs to create targeted knockdowns of candidate genes in the flagellated unicellular alga *Chlamydomonas reinhardtii*. Candidates were selected through a combination of comparative genomic, transcriptomic and proteomic analysis, and based on results from mutations in a variety of other model organisms. Two plasmids containing artificial microRNA sequences were created for each candidate gene, and *C. reinhardtii* transformed with these plasmids were then screened for flagellar motility defects. Cells which could still assemble flagella, but could not swim normally were selected for further analysis. Phenotypes of selected transformants included cells with paralyzed flagella (complete inability to swim), cells that could swim slowly, and cells showing other atypical forms of movement. Experiments are underway to screen selected transformants to confirm the predicted decreased mRNA and protein expression, and to characterize the knockdown phenotypes at the level of flagellar ultrastructure and motility. Additional planned validation involves complementation of knockdown phenotypes (back to normal motility) by expression of coding regions that lack microRNA targeting sequences and that include epitope tags for protein localization studies.

TEMPERATURE DEPENDENCE OF SELF-ASSEMBLY OF AMYLOID BETA PEPTIDE AT NANOSCALE GOLD COLLOIDAL SURFACE.

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The reversible self-assembly process involving oligomer of amyloid β1-40 peptide was examined on gold colloidal suspension of 20, 30, and 40 nm size under temperature ranging from 5 to 45 °C. As the pH was externally changed repetitively between pH 4 and 10, a reversible assembly was observed for an entire temperature range for 20 nm gold colloid. However, 30 and 40 nm colloids support the reversible process at lower than 18 °C and 6 °C, respectively. Even when temperature was increased in the middle of the self-assembly process, the reversible process was maintained. This specific and unique size and temperature dependence in reversible color change strongly suggests that the initially constructed conformation of the amyloid under the surface potential drives an entire reversible assembly process.

STABLE OPTICAL LIFT

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We are pioneering a new, opto-mechanical process called “optical lift”. In this process, carefully shaped, refractive objects, termed “lightfoils”, experience a force in the direction perpendicular to a uniform illuminating beam of light. In practice, lightfoils are on the order of several microns, and experience picoNewtons of force due to the change in the momentum of incident light. Arrays of lightfoils may be combined to generate forces of greater magnitude. We are further exploring this discovery for use on solar sail technology. Here we report our initial theoretical and experimental findings.

SCREENING OF TRANSPOSON MUTANTS OF SPHINGOBIUM SP. KK22 ALTERED IN QUORUM-SENSING SIGNAL SYNTHESIS

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We have shown that bacterium, *Sphingobium* sp. KK22, produces communication signals known as *N*-acyl-homoserine lactones (AHLs). AHLs signals function in a cell-to-cell gene regulatory process called quorum sensing (QS) that is cell density dependent. *Sphingobium* sp. KK22 was subjected to genetic mutagenesis using transposon Tn5 and the resulting mutants were screened for differences in AHL signal accumulation as compared to the wild type strain. Growth of wild type *Sphingobium* sp. KK22 in various media has showed that this strain produces different AHL signal profiles on different media and that the AHL profile is altered in different growth phases. Growth in R2A/TYE medium resulted in two AHL signals whereas growth in only R2A showed five AHL signals. Among the 1404 mutants screened, mutant M666 has been identified as overproducing AHL signals. The identification of the gene mutated in M666 will enable the identification of a gene responsible for AHL signal synthesis or a gene that acts in the regulation of AHL synthesis in this bacterium.

SURFACE EVOLUTION AND RETREAT PATTERNS OF THE NORTHWEST GREENLAND ICE SHEET: A MULTITEMPORAL, MULTISENSOR APPROACH TO UNDERSTANDING DYNAMIC GLACIER BEHAVIOR

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Over the past twenty years we have seen dramatic changes in the behavior of Greenland Ice Sheet (GrIS) outlet glaciers. Mass balance trends show acceleration in ice-mass loss, resulting in greater sea level rise than model predictions. Moreover, the mass loss is rapidly spreading towards higher latitudes and elevations; in particular along the northwestern coast. Although recent outlet glacier changes are well documented, the driving processes are not well understood. To better understand the mechanisms initiating these changes, it is important to extend the observational record to investigate long-term thinning and retreat of the GrIS. This study presents a reconstruction of surface evolution and outlet glacier retreat behavior within the northwest GrIS combining data from topographic maps, aerial photography, satellite imagery, and the synthesis of airborne and satellite altimetry measurements. Here we present results from our novel, comprehensive method called Surface Elevation Reconstruction And Change detection (SERAC), which estimates surface changes through simultaneous reconstruction of surface topography from fused multisensor data. We investigate the relationship between previous work on retreat patterns and new thinning histories. We compare changes in ice-mass over time, and the propagation of thinning to higher elevations, with climate records of both ocean and surface temperatures to constrain mechanisms driving these changes. Additionally we seek to estimate the potential contribution of the northwestern sector of the GrIS to sea level rise. This will be a benchmark for future studies, which will look more comprehensively at individual mechanisms.

CED-3 MUTANT *CAENORHABDITIS ELEGANS* DEMONSTRATE A DECREASED AMOUNT OF APOPTOSIS WITHIN THE GONAD

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Apoptosis is the process of programmed cell death and occurs after a signaling cascade takes place which in the end signals the cell to die. The process of apoptosis has been a topic of interest because when cells that typically undergo apoptosis do not, the result can be cancer. *Caenorhabditis elegans* is a model organism that has been used to study the process of apoptosis. Previous studies showed that within the first 3 to 4 days of adulthood 300 germline cells undergo apoptosis within the gonad of the N2, wild type, strain of *C. elegans*. Ced-3 mutants lack the protein ced-3 which functions similarly to a caspase found in humans. It is involved in a signaling cascade that results in apoptosis. We tested the hypothesis that ced-3 *C. elegans* would have a decreased amount of apoptosis in the gonad as compared to N2. In order to study apoptosis within the gonad, a technique was developed for visualizing the germline of *C. elegans* using differential interface contrast (DIC) microscopy. Using a 3mM levamisole solution, which acts as a relaxant to prevent movement, in a well made of petroleum jelly, DIC was used to visualize the gonad of the *C. elegans*. When using a 100x objective oil immersion lens normal and apoptotic germline cells can be distinguished due to their appearance. To quantify the number of apoptotic cells within each gonad, images were taken at 1000x and a counting field was imposed on the image. The number of apoptotic cells was recorded and compared between N2 and ced-3 mutants. Analysis of photographs revealed consistently fewer apoptotic cells in the gonad of ced-3 mutants compared to N2. These results suggest that ced-3 protein is involved in normal cell death of germline as well as somatic cells.

THE INVESTIGATION OF TIN(II) FLUORIDE AS A LEWIS ACID CATALYST FOR BIODIESEL PRODUCTION

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Biodiesel has become a very popular alternative fuel due to the increasing scarcity and expense of petroleum. One common and inexpensive precursor of biodiesel is waste cooking oil. However, this oil often contains high levels of free fatty acids (FFA), which require pre-treatment in the form of acid catalyzed esterification. Typically this is accomplished with methanol, and an inexpensive Brønsted acid catalyst, such as sulfuric acid. However, sulfuric acid is very corrosive and can cause the sulfur content of the final product to exceed the 7 ppm, a limit established by the EPA. We have been investigating the use of the Lewis acid tin(II) halide, in order to avoid the adverse characteristics associated with sulfuric acid. Our results show that these Lewis acids effectively catalyze the methylation of oleic acid. Kinetic studies were performed using ^{1}H NMR by converting the integrals at 3.7 ppm (methyl ester) and 2.3 ppm (□-carbonyl) into percent methyl ester formation. From the data collected thus far, the following trend in increasing activation energy has been obtained: $SnI_2 < SnBr_2 < SnCl_2 < SnF_2$.

THE INFLUENCE OF WATERSHED LAND USE ON THE COMPOSITION OF DISSOLVED ORGANIC MATTER ENTERING CONESUS LAKE, NY

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Agricultural land use within the watershed of the Finger Lakes Region of New York State influences the quality of water supplied to freshwater aquatic ecosystems by increasing the delivery of inorganic nutrients such as nitrate and phosphate. We know much less, however, about the influence of farming on the quantity or composition of dissolved organic matter (DOM) supplied to these systems. With 70% of the flow to Conesus Lake supplied by more than 18 unique streams and several smaller tributaries, the lake has a topography that makes it an ideal study site for an analysis of the effects of land use on DOM quality. Further, the recent decline in the water quality of Conesus Lake suggests that the ability of the system to sustain its multiple uses may be at risk. A comprehensive characterization of DOM entering the lake in relation to sub-watershed land use will provide valuable information for ongoing watershed restoration efforts. The chemical composition of DOM is significant for the support of aquatic food webs, the availability of nutrients and metals in aquatic ecosystems, and the optical properties of water. We hypothesize that the proportion of agricultural land use can be correlated to the chemical composition of DOM delivered to the system. By exploiting the optical properties of DOM using UV-visible spectroscopy and fluorescence excitation-emission matrices (EEMs) with parallel factor analysis (PARAFAC), a chemometric technique for the decomposition of characteristic fluorescence peaks, along with measurement of dissolved organic carbon (DOC), phenol, and nutrient concentrations, specific UV absorbance at 254 nm ($SUVA_{254}$), and the fluorescence index (FI), we will assess the influence of land use on the quality of DOM entering Conesus Lake.

CREATING HIGH RESOLUTION IMAGES FOR ENHANCED UNDERSTANDING OF BIOLOGICAL ORGANISMS

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Many professors who teach biology, particularly for non-majors, have considered switching to digitized microscope images because of perceived savings in time and money. With digitized slides, instructors would no longer have to spend large amounts of class time teaching individuals how to use a microscope and would no longer need to purchase and maintain a microscope for every student. New technology enables instructors to present the digitized images on a computer in a way that mimics the microscope. Although the technology is out there, there is not research discussing whether the latest technology is more beneficial to a student's understanding of the material. First, we want to know if it is even possible to simulate the experience of using a microscope on a computer. Can the digitized images provide an equivalent experience to that of a microscope? If it can, which method aids in the understanding of the material the most? This project was designed to determine students' needs and viewing preferences and to find a method to facilitate the transition to digital images. Digitizing the images consists of shooting multiple layers of the microscope slide, stitching the layers together, and then either outputting a focus-stacked image or leaving the layers intact for dynamic focusing. Focus-stacking collapses the various layers into a single layer and provides a uniform picture at each point in the 2-D plane of the image. Dynamic focusing enables the users to step through the multiple layers and look at each layer individually, similar to using a microscope. The current phase of our project focuses on running pilot studies, which will reveal how students utilize the different viewing formats and their preference. Ultimately, we want to know if the average student would still need to learn to use the microscope as an educational tool or if it would be more advantageous to replace it with the computer.

INVASIVE PLANTS SURVEY AT HIGH ACRES NATURE AREA, PERINTON, NY

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Wetlands are important ecosystems that provide many services such as stormwater detention, nutrient absorption, groundwater recharge, and wildlife habitat. Invasion of wetlands by aggressive species such as *Typha* sp. (cattail), *Phragmites australis* (common reed), *Phalaris arundinacea* (reed canarygrass), and *Lythrum salicaria* (purple loosestrife) alters community dynamics and is a management concern. Efficient use of nutrients, clonal growth forms resulting in monoculture, positive feedback loops and allelopathy are all potential invasion mechanisms. High Acres Nature Area (HANA) in Perinton, NY is a 250 ha site owned and managed by Waste Management Corp., and includes four mitigation wetlands constructed in 2009 along with a mosaic of natural wooded and emergent wetlands. Current management plans include mechanical and chemical means of control for invasive plants. GIS software ArcMAP was used to create a 10 m by 10 m point grid overlaying the created and natural wetlands at HANA to create potential survey points. Between 18 June 2011 and 20 August 2011 we surveyed 2000 points to determine plant cover and detect source populations of invasive plants. Wetland invasive species covered approximately 20% of the wetlands, with *Typha* sp. as the dominant invasive (11.6% cover), followed by *P. arundinacea* (8.4%) *P. australis* (6.3%), and *L. salicaria* (2.8%). Establishment of this baseline vegetation cover and permanent sampling points will allow for monitoring of the invasive species over time and assessment of control efficacy.

INVESTIGATION OF THE LOW ν METHOD TO DETERMINE NEUTRINO FLUX AT LOW ENERGIES

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We investigate the low ν method (developed by the CCFR/NuTeV collaborations) to determine the neutrino flux in a wide band neutrino beam at very low energies, a region of interest to neutrino oscillations experiments. Events with low hadronic final state energy $\nu < \nu_{cut}$ of 1, 2 and 5 GeV were used by the MINOS collaboration to determine the neutrino flux in their measurements of neutrino (ν_μ) and antineutrino ($\bar{\nu}_\mu$) total cross sections. The lowest ν_μ energy for which the method was applied is 3.5 GeV and the lowest $\bar{\nu}_\mu$ energy was 6 GeV. At these energies, the cross sections are dominated by inelastic processes. We investigate the application of the method to determine the neutrino flux for ν_μ and $\bar{\nu}_\mu$ energies as low as 0.75 GeV, where the cross sections are dominated by quasielastic scattering and Δ(1232) resonance production. We find that the method can be extended to low energies by using ν_{cut} values of 0.5 and 0.25 GeV, which are feasible in fully active neutrino detectors such as MINERvA.

A STUDY OF POWER GENERATION USING FERROMAGNETIC LIQUIDS

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Ferrofluids are usually made of liquid carrier in which ferromagnetic nanoparticles are coated with a surfactant float. The fluid magnetizes while in magnetic field but it loses almost all the magnetization while the external magnetic field is removed. We study mechanical energy conversion using the magnetic properties of a ferrofluid. The ferrofluid is used in a circular configuration that can rotate. The magnetic liquid is placed in a permanent magnetic field and it can enter and exit the signal pickup coils placed in a permanent static magnetic field. As the fluid enters the pickup coil, the inductance of the coil changes and voltage is induced in the coil. The induced voltage is studied at different fluid rotational frequencies and ferrofluid column lengths. The efficiency of the mechanical energy conversion is also assessed.

EXPERIMENTAL STUDY OF BROWN-BIEFELD EFFECT

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When a high voltage above corona onset is applied, an ion wind is generated. If used properly, it can be conducive to having the entire device fly in the air. This levitation phenomenon is called Brown-Biefeld effect, after the scientists who discovered it. Originally, and even in the last couple of years, this levitation phenomenon was thought to be generated due to forces that may be some sort of antigravity forces. However, recent research showed theoretically and experimentally that lifting forces can be explained on the basis of corona wind only. We designed, built, and successfully levitated a few lifters from balsa wood with masses between 5 g and 10 g. The levitation was achieved within the 17 kV to 25kV range. The main goal of the experimental research was to reveal the actual parameters when corona wind is in fact noticeable in different cross-sections of the different electric fields generated by the built devices. In this respect, additional devices were built (not designed to levitate) for observing corona wind inception only. Liquid nitrogen, smoke, and a 10^{o} fan angle laser sheet were used in the setup. Parameters were linked to the associated measured corona current.

METHYLATION OF PHENOLS WITH DMF-DMA USING A LABORATORY MICROWAVE

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We evaluated the potential of N,N-dimethylformamide dimethylacetal (DMF-DMA) as a methylating agent for a library of para-substituted phenols under microwave irradiation. The rate of reaction was dictated by the electronic nature of the para-substituent. With an electron-withdrawing group the reaction was completed within 30 min. For electron-donating groups, the reaction times were 60 min. Esterification and enamino-ketone formation was also observed with carboxylic acid and ketone functional groups, respectively.

STUDIES TOWARD THE TOTAL SYNTHESIS OF TROCHELIOPHOROLIDE A

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Trocheliophorolide A is one of four butenolide natural products found in the soft coral *Sarcophyton trocheliophorum* located in the Red Sea. The reason there is interest in synthesizing Trocheliophorolide A is because it has shown to be biologically active against *Staphylococcus aureus* and *Bacillus subtilis*. The synthesis of Trocheliophorolide A will be a convergent synthesis culminating in an organometallic coupling to join the two advanced intermediates.

HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC) ANALYSIS OF VITAMIN D_3 IN ALGAE SAMPLES

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Increasing levels of ultraviolet radiation (UVR) in freshwater systems have been detected with constantly changing environmental conditions. Organisms of freshwater ecosystems must adapt accordingly, these systems are particularly susceptible due to their high exposures to solar radiation. The overall purpose of this collaborative research is to determine the survival and reproduction rates of vitamin D_3 exposed *Daphnia* spp. under varying UVR conditions. In *Daphnia* spp., vitamin D_3 was evaluated for its photo-protective properties under UV-A and UV-B exposure. Vitamin D_3 and its metabolites were analyzed in experimental samples using High Performance Liquid Chromatography (HPLC). Vitamin D_3 and several metabolites were recovered in the *Daphnia* spp., algae food source (*Selenastrum capricornutum*), and aqueous samples following UV exposure in a controlled microcosm setting. In previous experimentation vitamin D_3 was recovered in control samples (0% vitamin D_3 addition) indicating a strong role of algae in the transport of nutrients to the *Daphnia* spp.

The current focus of this research is to test algae under stressed conditions to better understand the metabolic effects of vitamin D_3 and UVR with and without *Daphnia* spp. Through this experimentation, the source of vitamin D_3 metabolic conversion in freshwater ecosystems as well as the potential for the vitamin D_3 to act as an of environmental stress reducer in *Daphnia* spp. can be better understood.

DEVELOPING MICROPLATE ASSAYS FOR MCH SIGNALING

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Melanin-concentrating hormone (MCH) signaling regulates appetite and energy expenditure in mammals. Manipulation of MCH signaling pathways could potentially suppress appetite in obese patients. Our lab is interested in understanding how cells turn off this appetite signal. This study aims to develop microplate assays to measure MCH signaling leading to both leptin transcription and intracellular calcium flux in a BHK-570 cell culture model. MCH-induced secretion of leptin from adipogenic stores is used as a feedback mechanism to shut down appetite. To assess the dynamics of this signal, we cotransfected the mouse leptin promoter luciferase construct p(-762)ob-luc with MCHR1-eYFP and exposed the cells to MCH for various times. We were successful in measuring 2.8-fold increase in luciferase activity over control after 6 h of treatment. Using this method, we have explored the role of caveolin-1 in regulating MCH signaling and our preliminary data using RNAi suggests caveolin acts to suppress MCH signaling. A second cascade tested in microplate format was MCH signaling to calcium. We took two approaches: the first measures indirect calcium-mediated activation of a PKC responsive luciferase reporter construct AP1-fos –luc and the second utilized a calcium-sensitive dye Fluo-4 to measure calcium directly. With the PKC-responsive luciferase reporter we successfully measured 1.34 fold activation over control following 6h treatment with MCH. We are currently using this assay to explore the role of beta-arrestin 2 in regulating MCH-mediated calcium signaling. With the second approach, Fluo-4 allows us to measure rapid MCH-induced calcium transients. We compared signaling by MCHR1 to that of MCHR2 and found MCHR1 was able to signal changes in intracellular calcium levels via Fluo-4 fluorescence intensity better than MCHR2. We are currently working to optimize this assay for measure MCHR-1 signals. In conclusion, MCH signaling can successfully be studied in microplate format increasing output and broadening our lab's investigative capabilities.

SYNTHESIS AND CHARACTERIZATION OF NOVEL ORGANOSILICON COMPLEXES

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A series of novel organosilicon complexes of the form $R_xSi(OL)_{4-x}$ and $R_xSiCl_y(OL)_{4-x-y}$ [R = hydrogen, alkyl or aryl; OL = 4-methyl-2,6-bis(4-methylphenylimino)phenoxy] were prepared and characterized by ^{1}H, ^{13}C, and ^{29}Si NMR spectroscopy. All of the compounds exhibit tetracoordinate geometries in benzene solution at room temperature. The solid-state structure of $R_2Si(OL)_2$ (R = methyl) was determined by single-crystal x-ray crystallography and exhibits a hexacoordinate bicapped tetrahedral structure with two nitrogen atoms weakly interacting with silicon.

FACULTY AND TEXTBOOK ASSUMPTIONS OF STUDENT KNOWLEDGE THAT AFFECT LEARNING THE CONCEPTS OF MEIOSIS

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Students and professors rely on textbooks to accurately and reliably convey information. However, in order for textbooks to be useful, they must meet students where they are conceptually. In addition, faculty must be aware of their students' prior knowledge and mastery of a topic. Meiosis, a special type of cell division that creates sperm or ova, is a topic that many students have difficulty understanding but is extremely important in genetics and evolution. Transcription and analysis of student interviews conducted at RIT about meiosis have provided insight into students' thoughts and confusion. Issues such as chromosome structure and ploidy are among the most common stumbling blocks. These ideas are core concepts that must be comprehended before the specialized knowledge of meiosis can be clearly understood. We examined the explanations of meiosis in seventeen different college textbooks written for different levels (non-majors, majors introductory, and advanced), and surveyed faculty who teach the subject about what they believe students should know at each level. We found that both textbook authors and faculty make incorrect assumptions about how much students know at each level. Thus, instructors may not realize that they begin at the wrong place in their explanations. Since students never learn the basics, few students ever progress further to truly comprehend meiosis, and by extension genetics and evolution. This project has the potential to enhance biology education across the country by eliminating sources of misconceptions in meiosis, through the creation of better lesson plans, meiosis figures and/or an improved textbook chapter.

TIN (II) HALIDES AS CATALYSTS FOR THE ESTERIFICATION OF BIODIESEL

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Waste vegetable oils can be converted into biodiesel in the form of fatty acid methyl esters (FAME) as an effective replacement for petroleum diesel. Unfortunately waste oils often possess high free fatty acid (FFA) concentrations requiring acid catalysis in order to form the FAME found in biodiesel. Lewis acid catalysts represent a promising means of catalyzing the esterfication of FFAs because they are less corrosive than the traditionally employed Bronsted acids and do not add sulfur to the final product. The tin (II) halides are a common family of Lewis acids, which we have studied as catalysts for the methylation of oleic acid. The progress of this reaction was monitored via ^{1}H NMR and the kinetic data obtained shows the following order of increasing catalytic activity: $SnF_2 < SnCl_2 < SnBr_2 < SnI_2$. Analysis of this trend reveals an unexpectedly weak correlation with halide electronegativity and a strong correlation with both covalent and ionic radii of the halide. This talk will include a presentation of the methods employed as well as a discussion of the implications these results have on the mechanism of this reaction.

THE USE OF MICROSATELLITES AS A MEANS TO STUDY THE POPULATION STRUCTURE OF THE EASTERN HELLBENDER SALAMANDER, *CRYPTOBRANCHUS ALLEGANIENSIS ALLEGANIENSIS*

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Populations of the Eastern Hellbender salamander, *Cryptobranchus alleganiensis alleganiensis*, are quickly declining, making this a species of special concern in New York State. Contributing factors to their decline include UV radiation, predation, disease, habitat modification, and changes in climate. Because of this, hellbender habitats are becoming fragmented. This leads to isolation among populations, which impedes gene flow between populations of hellbenders. In order to determine how to conserve hellbenders, the structure of their populations must be studied to determine the genetic diversity present. Microsatellite markers are a powerful tool used to study the genetic makeup of a population. Primers developed by Unger and Duvra for the Eastern Hellbender salamander will be used in this study. The primers will be used to amplify microsatellite regions of highly polymorphic loci of hellbender DNA. The optimal annealing temperatures of these primers will be determined using hellbender tissue samples collected from the Buffalo Zoo. Genotyping of these hellbenders will be conducted, which will show the genetic diversity among these hellbender samples. This genetic information will then be used for a parentage analysis on 50 hellbender samples from the Buffalo Zoo. Educational material will be developed for the Buffalo Zoo hellbender exhibit to spread an awareness of the importance of conservation genetics. In addition, a series of lesson plans will be developed to be used by biology teachers as an important application in the teaching of genetics to high school students.

INDUCING APOPTOSIS: A KINETIC STUDY COMPARING TIME AND CONCENTRATION OF STAUROSPORINE AND OKADAIC ACID ON HELA AND MCF10A CELLS

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A survey conducted by The American Cancer Society found that in 2007, nearly 12 million people in the United States had developed cancer. Cancer occurs in the body when cells proliferate without undergoing the cell death cycle known as apoptosis. Staurosporine and okadaic acid are two known agents that have been discovered to induce apoptosis. Both agents have been used as a control to test the effectiveness of new drugs on inducing apoptosis in cancer cell lines. In order to further understand the mechanisms that induce apoptosis using staurosporine and okadaic acid, a kinetic study was performed using different times and concentrations of staurosporine and okadaic acid to induce apoptosis in the human epitheloid cervix carcinoma cell line (HeLa) and human breast epithelial cells MCF10A. It was hypothesized that increasing both variables would cause an increase in the number of apoptotic cells for both HeLa and MCF10A. Apoptosis was measured through flow cytometry, florescent microscopy, and enzyme-linked immunosorbent assay (ELISA) to determine apoptosis pathways in treated cells. The data suggested that both cell lines responded as predicted: increased concentrations and exposure to both agents caused increased apoptosis. The apoptotic pathways for each agent and cell line appeared to be different. By comparing the results of these studies, specific mechanisms for apoptosis can possibly be determined in each cell line with each type of drug. The results from this kinetic study will be helpful in future experiments where the effect of Vitamin D on potentiating apoptosis will be determined.

SEISMITE/TSUNAMIITE IN EURYPTERID-BEARING BEDS OF THE LATE SILURIAN BERTIE GROUP, NEW YORK AND ONTARIO, CANADA

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In 1976, Ciurca and Gartland described "An Upper Silurian brecciated water- lime unit bearing eurypterids, Niagara Peninsula of Ontario Canada" (GSA Abstract, 10th Ann. Meeting, V8, N4 p. 472). In subsequent years, the unit was traced across western New York State and described as the Ellicott Creek Breccia (ECB) as the uppermost member of the Fiddlers Green Formation with the type section at Ellicott Creek in Williamsville, New York.

The ECB, about 1.0 – 2.0 m thick, consists of eurypterid-bearing and stroma- tolitic waterlimes and fine-grained dolostone. Much or all of the ECB was de- posited under hypersaline conditions as indicated by the abundance of salt hopper structures (some 12 inches on an edge) at many localities.

Because of the widespread occurrence of the ECB, from Hagersville in Ontario, Canada, east to the Finger Lakes Region of New York State, and the thinness of the unit, it is suggested that parts or all of the ECB were subjected to a strong earthquake/tsunami (hence, seismite/tsunamiite). What initiated the earthquake is not known and the widespread distribution of such brecciation as seen in the ECB could also be the result of a bolide (i.e. an extraterrestrial body that collides with Earth).

Examination of breccia beds north of LeRoy, New York and at Phelps and other sites reveals breccia with sharply-defined fragments of sedimentary rock in- cluded, some perpendicular to the bedding. The origin of the clasts is not known, but many appear to represent the host rock – mostly waterlimes and finely-crys- talline dolostones. Clasts seen at Flint and Mud Creeks are pieces of stromatolites that have been observed in situ elsewhere (e.g. Ontario, Canada). Mineralization observed includes some chert, pyrite and sphalerite distributed through the beds.

The internal stratigraphy of the ECB remains to be worked out more thoroughly, including the distribution of the breccia beds within. At the type section, it is tri- partite (A, B and C). The distribution of the stromatolite beds is under study. One particular morphotype, the topographic waterlime (for example), was found to comprise almost the entire ECB in one section studied with breccia forming the uppermost layer.

STRATIGRAPHIC STUDIES ALONG THE ONONDAGA ESCARPMENT – THE LATE SILURIAN BERTIE GROUP IN WESTERN NEW YORK

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The Onondaga Escarpment is a well-known topographic feature across much of western New York. Occasionally, Late Silurian beds beneath are exposed and available for study if not in the escarpment itself, then in quarries in the Onondaga Limestone that have been excavated down (beneath unconformities) into the un- derlying dolomitic strata of the Bertie Group.

We have explored the escarpment from Indian Falls through Akron to Clarence. At Indian Falls are massive beds of the Victor Dolostone (Fiddlers Green Forma- tion) with little evidence of overlying beds at the site, so a search was made for more stratigraphically complete sections. More complete sections were found to the west.

The lowest beds of the Bertie Group exposed at Clarence (Sanctuary) are thick massive beds of brown dolostone (lower Victor Member) with crinkly structure that suggests they are part of an extensive thrombolite complex. About 2 meters were measured and these dense beds form the base of the cliff, supporting every-thing above. The lowest (Victor) beds are not exposed.

A relatively abrupt transition takes place above these massive beds resulting in a sequence of thinly-bedded waterlimes, some platy with characteristic black car- bonaceous layers. Within this sequence are abundant brachiopod 'ghosts' – i.e. micritized *Whitfieldella* so prolific within many of the beds of the Victor Member (Fiddlers Green Formation) in upstate New York. Layers are bioturbated, but eurypterid remains (*Eurypterus remipes* Biozone) are found in the 'cleaner' layers of the waterlime. While this sequence is about 2.5 m thick, it is overlain by some-what similar beds (2.3 m), some or all of which belong to the Victor Member. In such weathered sections, more detailed work needs to be done to elucidate the contact with the overlying Ellicott Creek Breccia (ECB).

The Ellicott Creek Breccia is recognizable and at least 1.4 m occur with stroma- tolite beds (topographic waterlime) at the top of the lower 1.0 m section. The uppermost ECB, about 40 cm, consists of brecciated, argillaceous, irregularly bedded dolostone where it is overlain by 85 cm of the Scajaquada Fm. in the section studied (the rest of the Scajaquada occurs higher in the cliff-face).

The most important observation made is noting the continued significance of microbialites (algal mats, stromatolites, thrombolites) during deposition of the entire Bertie Group – the group being well-known for the assemblages of euryp- terids that occur throughout the sequence. It is hoped that further study will provide answers that explain the unusual variety of lithologies exhibited by the units now regarded as belonging to the Bertie Group. With a distribution of over 250 miles, the Group is a fertile subject for study.

ANALYSIS OF BIOCHEMICAL MARKERS AND THEIR RELATIONSHIP TO RISK OF DEVELOPING CORONARY ARTERY DISEASE

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According to the National Institutes of Health, more than half a million men and women die from coronary artery disease (CAD) in the United States, making it the leading cause of death. CAD results from the build-up of plaque in the arteries involving compounds released by fatty tissues at sites of arterial damage. As the atherosclerotic plaque builds up, the blood vessel narrows and blood flow to the heart is restricted. When the plaque in the vessel cracks, platelet aggregation causes angina and/or myocardial infarction. The severity of plaque formation has been shown to correlate with indicators of oxidative stress, such as the production of reactive oxygen species and damage to a cell's proteins, lipids, and DNA. Markers of oxidative stress can be detected in human plasma samples. The purpose of this study is to compare and analyze the relative levels of markers of oxidative stress in patients with CAD in order to aid in diagnosis. Additionally, genotypic studies are under way to corroborate and elucidate the underlying genetic basis of CAD.

AN INVESTIGATION OF PHOSPHORYLATION OF A SPLICING FACTOR, SR45, IN ARABIDOPSIS THALIANA

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SR45 is an important splicing factor that is involved in multiple developmental processes in Arabidopsis thaliana. SR45 has two splicing isoforms, SR45.1 and SR45.2, that play distinct roles in root growth and flower development. SR45.1 has two predicted phosphorylation sites, threonine 218 (T218) and serine 219 (S219), that are missing in SR45.2. To further investigate the function of these two sites after phosphorylation, we substituted these amino acids in the existing SR45.1-GFP construct with aspartic acid (D) and glutamic acid (E) by site-direct mutagenesis. The resulting mutant genes were transformed into sr45-1 mutant plants to generate stable transgenic plants. The transgenic plant lines were screened by their resistance to herbicide and selected by the presence of the GFP signal. Our results show that the expression level of GFP and its sustainability are directly related to the effectiveness of the transgene. For the petal development, substitutions at either/both sites recovered the normal development to various degrees. For root growth, the double substitution resulted in overgrowth, while the substitution on T218 gave a better recovery than the substitution on S219. Therefore these data suggest that the phosphorylation of both T218 and S219 may not be necessary for the normal function of SR45.1 in both root and petal development. However, a phosphorylated T218, but not a phosphorylated S219, may be required for a fullyfunctional SR45.1 in roots.

THE ROLE OF RAD52P ISOFORMS IN DIRECT REPEAT-MEDIATED DELETION EVENTS

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The yeast, Saccharomyces cerevisiae, is a single-celled, facultatively anaerobic species of fungus that has been known since ancient times for its usefulness in both baking and brewing. Recently, it has served as an indispensable model organism in genetic and molecular studies. Like all eukaryotic organisms, S. cerevisiae contain mitochondria which are responsible for generating ATP molecules through oxidative phosphorylation. The proteins necessary for oxidative phosphorylation are encoded on mitochondrial DNA (mtDNA) located within the mitochondria. mtDNA is independent of the nuclear DNA. Similar to nuclear DNA, an accumulation of mutations in mtDNA can be detrimental. Often such mutations can lead to altered mitochondrial function which can cause diseases in higher organisms. Since yeast are facultative anaerobes they can survive in the absence of oxidative phosphorylation by undergoing fermentation to meet their energy needs. This enables the study of mtDNA mutations that would lead to inviability in other organisms.

Since mtDNA is important for ATP production it must be maintained and protected from damage. RAD52 is a nuclear gene that codes for a protein, Rad52p, which is important in homologous DNA recombination and double-strand break repair. It has been directly implicated in maintaining the integrity of nuclear DNA (1). The open reading frame contains a total of five potential start codons that may drive expression. A goal of the lab has been to determine whether one of the first three start codons is responsible for creating a Rad52p isoform that is localized to the mitochondria. This is being done through the creation of site-directed mutations of the different start codons. Cells with these mutations are then tested for their ability to undergo nuclear and mitochondrial direct repeat-mediated deletion events.

UREA IS A DYNAMIC POOL OF BIOAVAILABLE NITROGEN IN CORAL REEFS

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Urea may be an important source of nitrogen in low nutrient coral reef environments because corals and other organisms can assimilate it easily and it is found throughout ocean waters. We measured the distribution and concentrations of urea in seagrass beds, areas of schooling fish, coral formations and bottom sediments in the Upper Florida Keys Reef Tract. The flux of urea from bottom sediments was also measured. Ambient concentrations of urea in the offshore reefs were similar to concentrations of nitrate and ammonium. Seagrass beds, areas of schooling fish and coral formations had elevated concentrations of urea that were up to eight times higher than nitrate in the system. Numerous ephemeral hotspots of urea that were 8-20 times the ambient urea concentration existed in seagrass beds, areas of schooling fish, and above sediments. Coastal areas and inland canals had high urea concentrations where urban runoff and septic effluents were prevalent, but there was no anthropogenic influence in the offshore habitats. Urea concentrations above bottom sediments were not different from ambient concentrations and benthic flux chamber incubations showed biological activity in carbonaceous sediments but no net urea production. The decrease in urea concentrations from coasts and inland waterways to a consistent ambient concentration in the offshore reef system and ephemeral hotspots of high urea concentration suggest that urea is a dynamic pool of bioavailable nitrogen in the reefs of the Upper Florida Keys.

NON-HYDROLYTIC SOL-GEL SYNTHESIS AND CHARACTERIZATION OF $Ce_xHf_{1-x}O_2$ NANOCRYSTALS

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Mixed ceria (CeO_2) and hafnia (HfO_2) solid solutions have shown promise in applications for nuclear control rods, oxygen gas sensors, and solid electrolytes for fuel cells. In the bulk, pure CeO_2 crystallizes in the cubic phase and pure HfO_2 crystallizes in the monoclinic phase at room temperature. As CeO_2 is incorporated into the HfO_2 lattice, the phase changes from a monoclinic structure to a tetragonal structure (t'); as the concentration of CeO_2 is further increased, transformation to a second (t'') tetragonal phase is evidenced. When the solid-solution stoichiometry approaches a pure CeO_2 lattice, the cubic phase is observed. Scaling to finite size can alter the phase stabilities of transition metal oxides. Consequently, we have attempted to elucidate the nanoscale phase diagram of the CeO_2-HfO_2 system. $Ce_xHf_{1-x}O_2$ nanocrystals have been synthesized using the non-hydrolytic sol-gel method, involving the condensation reaction of a metal halide and a metal alkoxide through a S_N^1 mechanism. Tri-*n*-octylphosphine oxide is used as a high-boiling solvent, leading to the formation of monodisperse, high-crystalline-quality nanoparticles. The prepared nanocrystals have been characterized using X-ray diffraction, Raman spectroscopy, and transmission electron microscopy.

DO AGE, SEX AND SIZE INFLUENCE THE LENGTH OF STRAY DOGS AT NO-KILL SHELTERS IN NEW YORK?

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Very few animal shelters in the United States are "no-kill" shelters and few studies have been conducted on how long animals stay at such shelters before being adopted. To determine how age, sex, and size of dogs influence their length of stay (LOS), adoption records from the Tompkins County SPCA and the Yates County Humane Society – both no-kill shelters in New York State – were analyzed. The LOS in days was calculated for each dog adopted between 2008 and 2011 (n=707) by subtracting the adoption date from the intake date. LOS was regressed on age (years) to determine if older dogs had a greater LOS than younger dogs. The difference in LOS between the sexes was determined with a t-test. To examine the effect of size on LOS, individuals were separated into five categories ranging from XS (e.g., Chihuahua), S, M, L, to XL (e.g., Mastiff). The difference in LOS among size categories was examined with ANOVA. We found LOS increased linearly as age increased (LOS =1.84 * (age in years) + 35.3, DF=705, t=2.59, p=0.01, R^2=0.01). Sex had no influence on LOS. Regarding size categories, M sized dogs had the greatest LOS (48.8 days); XS dogs had the shortest LOS (33.4). Although age influenced LOS, as others have noted, it did not explain much of the variation in this response. Contrary to other studies, we found no influence of sex on LOS. This is the only study that has determined the effect of size categories on LOS.

VALUE OF NATIVE AND INVASIVE FRUIT-BEARING SHRUBS FOR MIGRATING SONGBIRDS

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Invasive species can out-compete native plants and disrupt the natural ecosystem of an area. It is important to understand how an invasive plant affects an ecosystem, especially when considering implementing a management strategy for the species. Songbirds are organisms that may rely on these invasive species for food and shelter. The objective of this study was to determine whether migrating songbirds prefer and/or benefit from the use of native or invasive fruit-bearing shrubs. We conducted nutritional analyses on the fruits of three native and three invasive shrub species with a focus on fat, sugar and energy content of the fruits. Of the species analyzed, a positive correlation between fat and energy content of the fruits was found and native dogwoods had higher fat and energy content than all invasive species. Insect density supported by four different focal shrub species was measured during the spring of 2010. There was no clear pattern of insect density between native and invasive shrub species during the spring migration period. Results from a fruit consumption experiment started in fall 2011 will provide insight into fruit preference by migrating songbirds in relation to fruit nutritional content. The results to date suggest that fruits of native shrubs are of higher nutritional value to migrating songbirds than the fruits of invasive shrubs during fall migration.

BIOFILMS PROTECT *CRYPTOSPORIDIUM PARVUM* OOCYSTS AGAINST INFECTIVITY LOSSES FROM SOLAR RADIATION EXPOSURE

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Cryptosporidium parvum infection can be fatal for immunocompromised people. Previous work has shown that ultraviolet (UV) disinfection inactivates oocysts in water supplies, and solar radiation reduces oocyst infectivity in the environment. The hypothesis that biofilms may provide a protective barrier against oocyst exposure to solar radiation was tested. Natural microbial assemblages from a Pennsylvania stream were used to grow biofilms in laboratory microcosms; biofilms were inoculated with oocysts and exposed to solar radiation in a temperature-controlled water bath. Oocyst permeability was determined with DAPI/PI staining, and oocyst infectivity was determined using in-vitro cell culture. Biofilm attachment was protective against solar UV exposure: less than 50% of solar UV radiation (compared to 82% of longer wavelengths) passed through the biofilm. The infectivity of oocysts attached at the biofilm surface (20%) was less than that of oocysts attached at the base of a 32-µm biofilm (39%) and not significantly different than the infectivity of oocysts suspended in water (19%). Sloughed oocysts were 56% less permeable, and subsequently more infectious (35%), than oocysts that had never been associated with a biofilm (19%). Disinfection efficacy of solar radiation for biofilm-associated oocysts is important because most oocysts will associate with potentially protective biofilm and/or fecal material in the environment.

CAGE OPENING/REARRANGEMENTS OF IODINATED CUBANE DERIVATIVES

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Based on previous studies of cubane it was found that vinylcubane has a tendency to undergo cage opening/rearrangement. It was in this finding that a cubyl styrene derivative was proposed in order to deter the cage opening of the cubane and thus perform polymerization from a vinylcubane-based monomer. The goal of this research was to perform a novel synthesis of this cubyl styrene derivative and attempt polymerization of the molecule in order to study the cage opening/rearrangement due to the possible initial radical formation. In addition, an iodinated cubyl aldehyde was also examined and remarkably, benzyl benzoate was ultimately formed, suggesting an alternate fragmentation pathway.

MYCORRHIZAE DISTRIBUTIONS BY DEPTH IN NORTHERN HARDWOOD ECOSYSTEMS

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Mycorrhizae are mutualistic associations between plant roots and soil-inhabiting fungi. Arbuscular mycorrhizae (AM) contain fungal structures within the plant cells, while ectomycorrhizas (EM) form structures surrounding the plant root cells. We are investigating the distribution of AM and EM roots as a function of soil depth, stand age, and site fertility in New Hampshire northern hardwoods. Roots were picked from soil cores and screened under a dissecting microscope for EM features. EM root length was measured by a line-intercept technique. Non-EM roots were cleared and stained using chitin-specific staining and scored under a stereo compound scope to determine the proportion of root length colonized by AM fungi. Preliminary results show greater AM colonization in the shallow (<30cm) and organic soil horizons than at depth. Understanding the belowground community can illuminate the natural history of soil-inhabiting organisms and better inform forest management practices.

BELOWGROUND PRODUCTIVITY OF HYBRID CATTAIL (*TYPHA* X *GLAUCA*) AND PURPLE LOOSESTRIFE (*LYTHRUM SALICARIA*) IN A CENTRAL NEW YORK MARSH

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Typha x *glauca* (Hybrid cattail) and *Lythrum salicaria* (Purple loosestrife) are dominant plants found in eastern North American freshwater wetlands. The prolific growth of these species has been linked to reductions in biodiversity and alteration of ecological processes in wetlands. Aboveground competition for light as well as profuse litter deposition are mechanisms by which *Typha* and *Lythrum* can outcompete neighboring vegetation. Prolific root growth can also pre-empt soil resources. We quantified root production during one growing season to better understand belowground dynamics in freshwater wetlands colonized by *Typha* and *Lythrum*. Root in-growth cores (length = 20.5 cm) were randomly placed in a *Typha*-dominated zone (n = 11) and a *Lythrum*-dominated zone (n = 9) in early June 2011. Cores contained root free, native marsh soil. Cores were left in the ground for 106 days and harvested in September 2011 to determine root growth over time. Coarse roots were extracted from the cores, dried, and weighed. We found that there was no difference in root belowground biomass between *Typha* and *Lythrum* plots (t-test; $p = 0.38$). The mean weight of coarse roots for the *Typha* plots was 172.36 mg cm^{-3} while the mean for the *Lythrum* plots was 184.42 mg cm^{-3}. Average productivity during the study was 1.63 mg^{-1} cm^{-3} day^{-1} in the *Typha* plots and 1.74 mg^{-1} cm^{-3} day^{-1} in the *Lythrum* plots. When extrapolated to broader scales, our data suggest the extent to which these species may change the structure and alter resource availability within wetland soils.

DREISSENID MUSSEL INVASION, COLONIZATION AND IMPACTS TO THE NUTRIENT BUDGET OF CANANDIAGUA LAKE

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Originating in eastern Europe and western Asia (the Black, Caspian and Aral Seas and the Ural River drainage), the dreissenid mussels have been introduced to North America through the discharge of freshwater international shipping ballast water. First found in the Great Lakes, they ultimately entered the Finger Lakes region of New York State. Their negative ecological and economic impacts are well documented from studies in many of the larger lakes.

Zebra mussels (*Dreissena polymorpha*) appeared in Canandaigua Lake around 1995 and quickly dominated the littoral zone attaching to hard, natural and artificial substrates. In 2001, population growth apparently surpassed planktonic food supply and massive quantities of dead zebra mussels appeared along the shoreline. Concurrently, large foam streaks occurred across the lake surface and total phosphorus concentrations in the water column nearly doubled. The next year, surviving zebra mussels recolonized, reaching densities of over 11,000/m^2 during the summer of 2002.

Quagga mussels (*Dreissena rostriformis bugensis*) appeared in Canandaigua Lake around 2008 and quickly dominated the profundal zone and portions of the littoral zone. Dredges samples collected in 2011 at several sites and water depths revealed densities of nearly 40,000/m^2. During their three years of colonization, total phosphorus levels reached historic lows for our 20 years of record.

GENETIC DIFFERENTIATION OF COMMON LOONS (*GAVIA IMMER*) FROM TWO REGIONS IN CANADA

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Understanding relationships between geographically separated populations is important to understanding evolutionary dynamics in a species. Common Loons (*Gavia immer*) are large, long-lived piscivorous birds that spend the summer breeding season on northern North American lakes and migrate to coastal waters for the winter. Loons are territorial during the breeding season and tend to return to their natal region for breeding, which suggests that eastern and western birds may be on different evolutionary paths. Furthermore, loons from eastern Canada winter on the Atlantic Ocean whereas loons from western Canada winter on the Pacific. In this study, the focus was the degree of differentiation between populations of Common Loons in Alberta and Quebec. Microsatellite loci GimA12EPA, GimC11EPA, GimA9EPA, and GimC5EPA were analyzed for significance differences in genotypic and allelic frequencies between the populations. DNA from 50 freeze-dried blood samples from locations within each region was extracted and amplified using polymerase chain reaction (PCR) with locus-specific primers. All populations and loci were within Hardy Weinberg predictions except for the GimC11EPA locus in Alberta loons. Loci GimC11EPA and GimA12EPA had significant allelic population differentiation (p=0 and 0.0231, respectively) as well as significant genotypic population differentiation (p=0 and 0.0128, respectively). These results suggest that Common Loon populations from across North America are genetically distinct and may respond to evolutionary change in different ways.

CHARACTERIZING WETLAND VEGETATION USING HYPERSPECTRAL IMAGERY

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Wetlands are important ecosystems that deliver numerous ecosystem services, including carbon sequestration, metal and pollutant removal, sediment trapping, and provision of habitat for many organisms, such as migratory birds. However, there has been a >50% decline of wetlands in the United States (U.S.) in the last 200 years. In an attempt to offset this loss creation of compensatory wetlands has been required in the U.S. since the late 1980's. The U.S. Army Corps of Engineers (Corps) requires vegetation monitoring of mitigated wetlands for five years following creation. However, wetland assessment is a time-consuming process that may also instigate disturbance to nascent plant communities. There is a need for approaches that minimize disturbance of these fragile ecosystems but still enable the collection of data over large portions of the landscape in a timely fashion. A potential method to quickly collect applicable ecosystem information with minimal impact to the environment is by combining remote sensing, typically hyperspectral imagery, and field data collection. Using spectral analysis techniques and training-validation based on field data, we will assess vegetation communities in natural reference wetlands and determine whether these same communities are present in in-kind mitigation wetlands. In July 2010, vegetation community composition, spectral signatures of individual plant species, canopy level spectral measurements, and an aerial hyperspectral imagery dataset were obtained from two natural and two mitigation wetlands on the Rochester Institute of Technology campus, Rochester, New York (NY). We are utilizing this data to develop a spectral library of common western NY wetland vegetation and plant communities. We will later extend our analyses to another regional mitigation site, High Acres Nature Area, in Penfield, NY to validate the model as a regionally appropriate assessment tool. This project will be presented at the 2011 Rochester Academy of Sciences meeting.

EFFECTS OF LIGHT AND FEEDING ON GROWTH OF THE CARIBBEAN CORAL *ACROPORA CERVICORNIS*

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Light and feeding are important in providing energy and nutrients for growth in reef building symbiotic corals. In shallow waters, light is abundant and corals rely on their photosynthetic symbionts for essential nutrients, whereas in deeper waters corals with lower light levels corals may rely on heterotrophic feeding to a greater extent. Therefore, both high light and availability of food resources such as zooplankton can have a positive effect on growth. To test these theories, we grew the Scleractinian coral, *Acropora cervicornis* under different combinations of high light, low light, feeding, and starved conditions. We observed that growth of *A. cervicornis* was enhanced by light but not by feeding, with starved corals growing faster than fed corals. Under high light conditions, higher amounts of coral tissue were produced and $\delta^{13}C$ values were enriched indicating higher rates of photosynthesis and production of organic matter in the symbiont. When deprived of food, coral actually increased their biomass, protein, zooxanthellae density, and chlorophyll content to obtain a greater amount of photosynthetically derived materials from its symbionts. Therefore, *A. cervicornis* relies heavily on its algal symbionts, preferring a survival based on autotrophy rather than heterotrophy. Past investigations studying the effects on light and feeding in other coral species has enabled us to conclude that light and feeding are both important in corals, however their effects can drastically differ from species to species.

NMR MICROSCOPY: APPLICATIONS IN BOTONY

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High-resolution nuclear magnetic resonance (NMR) spectrometers with three-axis gradient systems can be used to produce magnetic resonance images of small objects less than 4.5 mm in diameter. As such, they operate as an NMR microscope producing, magnetic resonance images of the hydrogen NMR signal from the sample. Image contrast is achieved by having structures in the object with different water content as well as spin-lattice and/or spin-spin relaxation times. Various imaging parameters can be altered to optimize the signal-to-noise ratio (SNR), resolution, and contrast in an image. The instrument and technique are well suited to image plant stems, small fish, insects, and biological specimens. In this poster the factors governing image contrast, SNR, and resolution will be presented. The utility of the NMR microscopy will be demonstrated on small fish and plant stems. We believe that its greatest utility will be in studies of dehydration stress, insect attack, mineral uptake, and structure in plant stems. Cross sectional images of several different plant stems are presented.

LOCALIZATION OF MELANIN-CONCENTRATING HORMONE RECEPTOR 1 TO CAVEOLAE CAN BE MODULATED BY OVEREXPRESSION OF ARRESTINS

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Melanin-concentrating hormone (MCH) is an important player in the regulation of appetite in higher order mammals, including humans; so much so that it is considered to be a pharmacological target in the treatment of obesity. G protein-coupled receptors for MCH are located in both the brain and peripheral tissues, and it has been shown that MCH signaling on adipocytes results in an increase in leptin transcription and secretion causing a central satiety signal. Presumably, improper desensitization of MCH signaling or an overactive pathway could result in an appetite disorder. Very little is known about how MCH signals are regulated and desensitized in cells, particularly in adipocytes. A few studies demonstrate the potential for this receptor to internalize in beta-arrestin or GRK overexpression systems. Our lab recently showed that when cells overexpressing arrestin are given MCH for 30 min about 40% of surface-localized MCHR1 internalizes using a cell-surface ELISA; whereas in control cells (-arrestin) only 15% of surface receptor internalized. This made us question the importance of clathrin-mediated endocytosis in certain cell types and we hypothesized that the extensive localization of MCHR1 to caveolae might play an important role in regulating its activity. We hypothesized that clathrin-mediated internalization of MCH-bound MCHR1 would have to be preceded by movement of receptors out of caveolae into non-caveolae membranes. We first verified the co-localization of MCHR1 with caveolin-1 on sucrose gradients from both cell lysates prepared by Triton-X-100 extraction and sodium carbonate extraction at pH11 and decided to continue with the latter method. In transfected BHK cells, MCH did not cause any visible change in the distribution of MCHR1 across the sucrose gradient, however when arrestins were also overexpressed MCHR1 was less localized to caveolae-containing fractions. This suggests that arrestins do have the potential to pull MCHR1 from caveolae membranes, even in a native, non-agonist bound conformation. Future experiments will continue to explore the role of caveolae in the regulation of endogenous MCHR1 signaling in 3T3-L1 pre- and post-adipocytes where caveolae accumulate during the differentiation process.

MULTI LOCUS SEQUENCE TYPING ANALYSIS OF *STAPHYLOCOCCUS* ISOLATES FROM WHITE TAILED DEER

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The ever-growing threat of methicillin resistant *Staphylococcous aureus* (MRSA) requires fast and accurate typing methods for epidemiological surveillance of local and global populations. Conventional methods, such as pulsed field gel electrophoresis and observations of phenotypic characterizations, do not give unequivocal results due to the subjective nature of the data collection.

To combat this problem, the use of DNA sequence-based typing methods have been utilized to identify *Staphylococcus* isolates retrieved from the white tailed deer population of Western New York. It was determined by the investigators to amplify and sequence several genes around the chromosome to analyze genome heterogeneity. The genes, manganese-dependent superoxide dismutase gene (*sod*A*),* coagulase gene (*coa*), *rpo*B, which encodes for the beta subunit of RNA polymerase, heat shock protein 40 gene (*dnaJ), Staphylococcus* protein A gene (*spa),* and the heat shock protein 60 gene (*hsp*60*),* are general housekeeping genes and therefore should be found in different species of *Staphylococcus*. Specific primers for the genes were constructed and then used to analyze the isolates.

EXPRESSION OF FACT IN MAMMALIAN TISSUES SUGGESTS ITS ROLE IN MAINTAINING OF UNDIFFERENTIATED STATE OF CELLS

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The Facilitates Chromatin Transcription (FACT) chromatin remodeling complex, comprised of two subunits, SSRP1 and SPT16, is involved in transcription, replication and DNA repair. We recently showed that curaxins, small molecules with anti-cancer activity, target FACT and kill tumor cells in a FACT-dependent manner. We also found that FACT is overexpressed in human and mouse tumors and that tumor cells are sensitive to FACT downregulation. To clarify the clinical potential of FACT inhibition, we were interested in physiological role(s) of FACT in multicellular organisms. We analyzed SSRP1 and SPT16 expression in different cells, tissues and conditions using Immunohistochemical (IHC) staining of mouse and human tissues and analysis of publicly available high-content gene expression datasets. Both approaches demonstrated coordinated expression of the two FACT subunits, which was primarily associated with the stage of cellular differentiation. Most cells of adult tissues do not have detectable protein level of FACT. High FACT expression was associated with stem or less-differentiated cells, while low FACT levels were seen in more differentiated cells. Experimental manipulation of cell differentiation and proliferation in vitro, as well as tissue staining for the Ki67 proliferation marker, showed that FACT expression is related more to differentiation than to proliferation. Thus, FACT may be part of a stem cell-like gene expression signature and play a role in maintaining cells in an undifferentiated state, which is consistent with its potential role as an anti-cancer target.

MACROPHYTE SURVEYS FOR HEMLOCK AND CANADICE LAKES

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Macrophyte communities characterize the littoral zone of the Finger Lakes. These communities contain some aquatic plants that grow completely submerged in the water, others with leaves floating on the surface, and still others with leaves emerging from the water. High species richness in macrophyte communities often exists, but the taxonomy of several genera (e.g., *Myriophyllum*, *Najas*, *Potamogeton*) can be problematic. For these and other reasons, detailed compositional studies have been neglected in some of the lakes.

Macrophyte communities are an essential component of healthy aquatic ecosystems. Their anchoring structures help keep bottom substrates in place, reducing sediment re-suspension and minimizing shoreline turbidity and near-shore benthic deposition that might otherwise have undesirable effects on certain life stages of lake organisms, in particular, fish eggs. Macrophyte stems and leaves also reduce wave energy thereby protecting shorelines from erosion. On a daily basis, macrophytes enhance the dissolved oxygen supply in the water through their photosynthetic activity. Macrophytes also improve water quality as they help control algal abundance by competitively utilizing significant portions of a lake's nutrient budget. Most importantly, macrophytes are a critical habitat for many lake organisms, providing food, shelter and nesting materials.

System-wide macrophyte surveys are recommended every few years, especially to document the arrival of aquatic nuisance species and begin their management before they become widely established. A modern survey is especially timely for Canadice and Hemlock Lakes because of the recent New York State acquisition of the City of Rochester watershed lands, and the immediate work being undertaken to develop a Unit Management Plan for the new, permanently protected State holdings. Historical macrophyte information is generally lacking for the smaller Finger Lakes, with the early researchers concentrating their efforts on the larger lakes. After intensive herbaria searches and review of unpublished reports, a preliminary historical list for both lakes was developed. A modern inventory is desirable to improve knowledge about the biology of these lakes and to establish baseline data for future comparative studies. It is noteworthy that these lakes possess a character that is unique among the Finger Lakes (i.e., no shoreline development and stringent regulations on watershed and lake activities).

The aquatic plant community composition of both lakes was sampled first by snorkeling and, a month later, by macrophyte raking. Sample site location was recorded by GPS coordinates. The littoral zone was large at the north and south ends of the lakes, but was reduced to a narrow strip of vegetation along the eastern and western shorelines. Embayments along depositional points had moderate sized aquatic plant communities. Voucher specimens of all plants were collected, pressed, mounted and placed into the Finger Lakes Herbarium at Finger Lakes Community College.

Most historical records were reconfirmed with modern collections. Many different species were encountered during the course of the study, including 31vascular plants and 2 macro-algae. Exceptionally dense growth of the native Elodea (*Elodea canadensis*) was noted at the south end of both lakes. Three species, brittle naiad (*Najas minor*), curly leaf pondweed (*Potamogeton crispus*) and Eurasian water milfoil (*Myriophyllum spicatum*), are exotic invaders. They were widely distributed in both lakes and often shared dominance in the community. This represents the first report of brittle naiad for the lakes. Native to Europe and western Asia, brittle naiad was first detected in Ohio in 1932, and has since spread to several northeastern states. It is a slender, annual plant with paired leaves and

stems that profusely branch near the growing tips. The leaves are stiff, recurved and pointed, and have spines along the leaf margins. The growth form is usually compact and appears billowy. The plant earns its common name from its fragile nature, and is thought to spread by fragmentation as well as seed production.

RESEARCH OPPORTUNITIES AT THE MULLER FIELD STATION OF FINGER LAKES COMMUNITY COLLEGE

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Located in the southern Honeoye Valley, the Muller Field Station is ideally centered in the western Finger Lakes and can offer residential scientific facilities for those conducting local, field-based research. Received as a gift from Florence Muller in December 1999, the field station's mission is multifaceted: (1) to serve as a learning and research center where people acquire knowledge and share information about the Finger Lakes region, (2) to promote understanding and appreciation of environmental issues and the unique natural resources of the Finger Lakes region and (3) to provide experiential education and scientific research opportunities for students and the community living in the Finger Lakes region. The 50 acre property has direct access to Honeoye Lake through the Inlet Channel. Canoes and kayaks are available on site, and a recently constructed concrete launch ramp is suited for small boats. Terrestrial trails lead from the field station lands to the immediately adjacent 2200 acre New York State Department of Environmental Conservation Honeoye Inlet Wildlife Management Area. Other nearby natural lands where field-based research might be conducted include: Conesus Inlet Fish and Wildlife Management Area (1120 acres) managed by the New York State Department of Environmental Conservation, Cumming Nature Center (900 acres) managed by the Rochester Museum and Science Center, Grimes Glen (32 acres) managed by Ontario County, Harriet Hollister Spencer State Recreation Area (1235 acres) managed by the New York State Office of Parks, Recreation and Historical Preservation, Hemlock-Canadice State Forest (6,684 acres) managed by the New York State Department of Environmental Conservation, High Tor Wildlife Management Area (6100 acres) managed by the New York State Department of Environmental Conservation, Honeoye Creek Wildlife Management Area (717 acres) managed by New York State Department of Environmental Conservation, Muller Camp (165 acres) managed by the Nature Conservancy, Rob's Trail (170 acres) managed by the Nature Conservancy, Warren Cutler Boy Scout Reservation (1200 acres) managed by the Seneca Waterways Council, Wesley Hill Nature Preserve (390 acres) managed by the Finger Lakes Land Trust, Taylor Marsh managed by the Bergen Swamp Preservation Society, and West Hill Nature Preserve (450 acres) managed by the Nature Conservancy. Numerous ecological habitats occur within these natural areas and complete land use and land cover maps, utilizing the New York State Natural Heritage Community Classification System are available for the entire watersheds of Canadice, Hemlock, Honeoye and Canandaigua Lakes. Surrounding the Muller Field Station, over 40 natural communities have been identified including linear assemblages like rocky, headwater streams, expansive cover types like Appalachian oak-hickory forest and silver maple-ash swamp, and small imbedded communities like vernal pools and shale talus slope woodlands. A biodiversity report for the southern Honeoye Valley identifies both rare and common species worthy of scientific investigation. Over 1200 species have been documented so far. There are at least 75 non-flowering plants, including lichens, mosses and ferns. The region is home to eleven conifers. By far the largest group of organisms identified has been the flowering plants with a total of 555 different species. With time, the number of insects will surpass the flowering plant total but at present the insect biodiversity is about 200 species. There have been 20

species of amphibians noted in the southern Honeoye Valley and 15 species of reptiles including three Heritage ranked species, the spiny soft-shell turtle, the timber rattlesnake and the coal skink. Twenty seven different types of fish are known from Honeoye Lake and its tributary streams. Most of the larger mammals have been inventoried, but smaller species are still being assessed. So far, 32 species of mammals are known to inhabit this region. Black bear and fisher have naturally returned and river otter have been restored through a release program. Birds that migrate through or nest within the southern Honeoye Valley total 159 species. Conservation targets needing more scientific research have been recently identified by The Nature Conservancy during a series of workshops hosted at the Muller Field Station. Their targets are: woodland salamanders, melt water channels and till seepages, bedrock controlled systems, matrix forest systems, lacustrine systems, and low gradient and main-stem streams.

Research opportunities exist at many scales. The field station is less than one hour driving time from six Finger Lakes (Canadice, Canandaigua, Conesus, Hemlock, Honeoye and Keuka) and their biologically diverse watersheds. Field-based terrestrial succession studies and ecological investigations within many forest types are possible. Some cultural impacts on natural communities are known, others need creative scientific investigation. Many opportunities exist for study of individual species. Long term ecological monitoring to evaluate watershed remedial action programs is another desirable possibility in the conservation landscape of the western Finger Lakes.

REEF BUILDING CORALS RELY ON SYMBIONTS FOR ENERGY AND NUTRIENTS OVER A LARGE DEPTH RANGE

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Corals living in shallow waters typically acquire their nutrients and energy from their photosynthetic symbiotic zooxanthellae, whereas deeper corals may rely to a lower extent on photosynthetic derived materials due to lower light levels. Whether these deeper corals feed to a greater extent is hotly debated within the community. We separately measured the stable carbon and nitrogen isotope signatures of the coral host and symbiotic zooxanthellae of three species of reef building corals (*Porites asteroides, Montastraea cavernosa, and Montastraea faveolata*) along a depth gradient (3-40m) of the Florida Reef Tract. The $\delta^{13}C$ and $\delta^{15}N$ values of the zooxanthellae and host tissue of all three species became progressively more depleted in ^{13}C and ^{15}N with depth. The lower $\delta^{15}N$ values at depth suggest that feeding is actually less important at depth. Further, we found a strong correlation between the $\delta^{13}C$ values of the host and their zooxanthellae at all depths, suggesting that even as photosynthetic rates decrease with depth, hosts continue to acquire most of their carbon from their symbionts and do not rely to any greater extent on feeding heterotrophically.

MELANIN-CONCENTRATING HORMONE RECEPTOR 1 PROTEIN LEVELS INCREASE WITH LONG-TERM MCH TREATMENT IN TRANSFECTED BHK CELLS

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Melanin-concentration hormone receptor 1 (MCHR1) knockout mice have limited incidence of diet-induced obesity. This makes MCHR1 a possible drug target to fight human obesity. MCHR1 is a G-protein coupled receptor that transfers information across cell membranes and activates signal transduction pathways. These receptors are often internalized to prevent overstimulation of the cell, however alternative desensitization mechanisms have been observed. Our lab has previously determined that less than 15% of surface-localized MCHR1 internalizes within 30 min of MCH treatment via a cell-based ELISA despite rapid ERK desensitization. This study investigates the possibility that long-term MCH treatment of cells promotes further downregulation of MCHR1 beyond that seen in previous studies. We utilized transfected BHK570 cells expressing VSVg-MCHR1 for our initial studies. We hypothesized that after continued exposure to MCH, MCHR1 would be slowly removed from the plasma membrane resulting in internal pools of receptor destined for lysosomal degradation. We observed a steady increase in MCHR1 protein levels up to 18 h MCH treatment with a steep decline at 24 h via Western blot. Surprisingly, when we quantified changes in individual band intensities using ImageJ, it was determined that MCHR1 protein increased by 59.4%. This was entirely unexpected and suggests that either an increase in transcription or an increase in protein stability occurs with MCH treatment. Because this is a transient-transfection model system, MCHR1 is not controlled by its native promoter and therefore the effects of MCH are most likely due to changes in protein stability of MCHR1. We are currently working hard to determine whether similar observations are found in 3T3-L1 pre- and post-adipocytes to which MCHR1 is endogenously expressed.

CLUSTERING OF DISARTICULATED REMAINS OF LARGE VERTEBRATES AT THE HISCOCK SITE

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Although virtually all specimens found at the Hiscock Site are found completely disarticulated, the clustering of these specimens has long been evident to the field researchers. The recent completion of a computer database of the field and laboratory records of all Hiscock Site specimens and artifacts enables spatial statistical analysis of the finds using Geographical Information System tools. In this paper, the statistical basis of specimen clustering of three species—*Mammut americanum*, *Cervus canadensis,* and *Odocoileus virginianus*—is demonstrated. For *Mammut (*in the Pleistocene deposits), a series of Nearest Neighbor Analyses yielded very low (negative) Z-scores, ranging from -7.77 to -9.01, indicating a very high degree of clustering. A series of High/Low Clustering (Getis-Ord General G) Analyses yielded very high Z-scores, ranging from 16.90 to 25.13, again indicating a very high degree of high-value clustering. For *Cervus* (in the Pleistocene deposits), High/Low Clustering Analysis yielded a Z-score of 5.01, indicating a high degree of clustering. For *Odocoileus* (Holocene), High/Low Clustering Analysis also yielded very high Z-scores, ranging from 16.90 to 25.13, again indicating a very high degree of clustering.

TREATMENT WITH MELANIN-CONCENTRATING HORMONE CAUSES β-ARRESTIN 2 RECRUITMENT TO THE PLASMA MEMBRANE AND RECEPTOR INTERNALIZATION

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The obesity epidemic in the United States continues to worsen from year to year. It often results from the inability to control appetite, and poses serious health-related threats. Recent studies have found that melanin-concentrating hormone (MCH) signaling may be involved in appetite control and energy expenditure. A study was performed with leptin-deficient OB/OB mice, and when MCH receptor 1 (MCHR1) was depleted, the mice became lean and hyperactive. On the other hand, when MCHR1 was overexpressed, the mice became obese and lethargic. To discover the mechanism behind this, the signaling pathway of MCH must be studied. MCHR1 is a G protein-coupled receptor (GPCR). When MCH, an agonist, binds to MCHR1, this GPCR is phosphorylated at the C-terminus. Phosphorylation leads to the recruitment of β-arrestin, which prevents a signaling cascade from being triggered. From here, clathrin-coated pits are formed, and the receptor is removed from the plasma membrane. The receptor can then either be recycled back to the plasma membrane, or degraded in a lysosome. In this study, we want to see if β-arrestin 1 and 2 are recruited after cells are treated with MCH. First, BHK cells stably expressing VSVg-tagged MCHR1 will be transfected with GFP-tagged arrestin. The cells will be treated with MCH over a 30 minute time course, and fixed. Fluorescent microscopy will be used to view the cells. Secondly, BHK cells will be cotransfected with VSVg-tagged MCHR1 and GFP-tagged arrestin, and once again, fluorescent microscopy will be utilized. Lastly, BHK cells cotransfected with VSVg-tagged MCHR1 and GFP-tagged arrestin will be treated with MCH and monitored for 30 minutes using live microscopy. We will be able to see the effects of MCH on arrestin recruitment and receptor using these techniques.

VISUALIZATION OF NOVEL GUIDEPOST CELLS IN DROSOPHILA OLFACTORY MAP DEVELOPMENT

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Our ability to distinguish different smells depends on the systematic organization of olfactory sensory inputs in the olfactory bulb, also called the olfactory map. Understanding how the map is built during embryogenesis is therefore critical for understanding how our sense of smell develops. In the *Drosophila* antennal lobe, equivalent to our olfactory bulb, olfactory receptor axons target the dendrites of projection neuron to form a precise three-dimensional synaptic map. How the dendritic arbors become organized in the map is unknown. We found that the *wnt5* gene is needed for the precise patterning of the map. The Wnt5 protein is expressed in restricted domains in the developing antennal lobe, and its loss severely disrupted the patterning of the dendritic arbors. The Wnt5 expression pattern may act as a template for the fly olfactory map. We propose the existence of novel guidepost cells that express the Wnt5 protein. To characterize these guidepost cells, we began the process of placing the *Gal4* gene under the control of the *wnt5* promoter using the technique of gene targeting by homologous recombination. We have screened 243,332 flies of which 5 have been identified to be X-linked insertions. Currently we are characterizing these insertions and will be presenting our findings on the poster.

GENERATING INTEREST IN PLANT BIOLOGY AMONG PREDOMINANTLY PRE-MED UNDERGRADUATES USING A POPULAR SCIENCE NOVEL

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Many undergraduate pre-med students see little relevance of plant biology to their daily lives or future careers. I have developed assignments for a sophomore-level plant biology course that incorporate readings from *The Botany of Desire* by Michael Pollan. After reading a chapter students define botanical terms within the context of the book and write a response to several instructor-provided questions. Each chapter is integrated into a larger topic in class and students discussed relationships between topics in the novel and course content. For example, the fourth chapter discusses domestication and genetic manipulation of the potato. Students are asked to compare traditional Peruvian potatoes to those available in grocery stores and discuss the feasibility of growing a wide variety of potatoes on a large scale in the United States. In class, the chapter is used as a guide for learning about the creation of genetically modified (GM) crops where students compare genetic transformation to plant breeding, create a list of the pros and cons, discuss prior beliefs and formulate their own scientifically-based opinion on use of GM crops. The majority of students (85%) responded positively to the activities and most students said the book was applicable to class content and helped them relate to the material.

WHY IS THERE MUCH SCATTER IN PUBLISHED DATA FOR SURFACE TENSION AND CRITICAL AGGREGATION CONCENTRATION IN AQUEOUS SOLUTIONS OF SEVERAL IONIC LIQUIDS?

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The composition dependent surface tensions for aqueous solutions of several imidazolium based ionic liquids with aliphatic side chain lengths ranging from one to six carbons were measured. A number of conceivable impurities were purposely added to study how they affect measurement results. Our findings show that a combination of detergent and vacuum grease impurities is the most likely cause of large discrepancies in published literature data. Moreover, the aggregation process of ionic liquids in water is found to be gradual with increasing concentration of the studied ionic liquids, which necessitates measurements over a wide range of concentrations to properly determine critical aggregation concentrations. Finally, the meaningfulness of critical aggregation numbers is generally questionable for ionic liquids with short aliphatic side chains.

INFLUENCE OF WOODY PLANT ABUNDANCE ON THE RESPONSE OF SOIL MICROBIAL RESPIRATION TO PLANT ROOT EXUDATES

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Widespread and accelerating anthropogenic climate change and shifting patterns of land-use demand an improved understanding of terrestrial carbon cycling. As a major contributor to ecosystem CO_2 exchange, the potentially dynamic factors that control soil microbial respiration warrant close scrutiny. Historically, the soil surface has been viewed as the boundary between distinct above- and belowground components of a terrestrial ecosystem. A modern view suggests that plants mediate the activity of soil microbes through litter inputs (Wardle et al. 2004). We suggest extending this conceptual model to include the contribution of plant root exudates in mediating microbial respiration. Moreover, we predict that the influence of root exudates on microbial respiration varies across different plant communities. Specifically, we predict that an increase in woody plant abundance associated with old-field succession following agricultural abandonment will increase the sensitivity of microbial respiration to root exudates. To address our predictions, we propose an incubation experiment in which we will document the microbial respiration response to the addition of simulated root exudates in soils collected from plant communities along an old-field succession gradient. By improving understanding of the linkages between plant communities and soil microbial activity, our results should improve predictions of the carbon cycling consequences of changing land-use patterns associated with agricultural abandonment.

BLACK BEAR TRAILS & SIGN: A PRELIMINARY STUDY

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The Black Bear Management class at Finger Lakes Community College studied a particular type of black bear (*Ursus americanus*) behavior during the 2010-11 school year. We were interested in better understanding the characteristics and potential purposes of trails left by black bears in which the bears step directly into the same footfalls each time. These trails, called ritual, hot foot or retread trials, consist of readily visible circular depressions. We found mention in popular and scientific literature of both grizzly (*Ursus arctos horribilis*) and black bears creating such trails, however we were unable to find any quantitative work regarding the characteristics and creation of the trails. In July, the class travelled to Massachusetts under a National Science Foundation grant to view an active trail. We noted the proliferation of associated sign along the trail including bites, scratches, rubs and straddle trees. Camera traps were deployed in order to record frequency and timing of use. We measured the stride and straddle of the trails and found that these trails did not conform to the measurements one would expect from a bear walking "normally", implying that these trails are formed while bears are employing a deliberately altered gait.

A 3-DIMENSIONAL ANGIOGENESIS ASSAY USING CALF PULMONARY ARTERY ENDOTHELIAL (CPAE) CELLS GROWN ON GELTREX

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Calf Pulmonary Artery Endothelial (CPAE) cells are an endothelial cell line derived from the main stem pulmonary artery of a young cow (*Bos taurus*). Endothelial cells play a key role in angiogenesis, the development of new blood vessels from pre-existing vessels. Angiogenesis is a multi-step process that is important for both physiological and pathological development. During angiogenesis, endothelial cells become activated and matrix metalloproteinases enzymes (MMPs) are expressed. In response to environmental cues, endothelial cells secrete MMPs to degrade the vascular basement membrane. We are attempting to model this angiogenesis process using CPAE endothelial cells grown on Geltrex. We are testing whether the CPAE cells invade the Geltrex matrix and form a 3D branching vessel system. If invasion of the Geltrex matrix is observed, the successfully invading cells will be stained with fluorescence dye to detect the formation of a new capillary tube network. Three-D angiogenesis models may give new insights into developmental and pathological angiogenesis.

THE WARRIOR SUITOR OF MOKI: A LOOK INTO 19TH CENTURY ZUNI CULTURE THROUGH MYTH.

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Myths and folklore are too often either forgotten about or regarded in the academic world as unreliable avenues of insight into a cultural perspective. In this presentation, I will use a method of analysis based on one pioneered by the well-known philosopher and anthropologist Claude Levi-Strauss to demonstrate that myths and folklore are rich in information and can be very useful for understanding their respective cultures. In particular, this presentation focuses on the problems of liminality and social place in the Zuni world around the turn of the last century, based on multiple myths collected by Frank Cushing, focusing in particular on “The Warrior Suitor of Moki.”

PREVALENCE OF EPITHELIAL TO MESENCHYMAL TRANSITION (EMT) RESULTING FROM ULTRAPOTENT CORTICOSTEROID TREATMENT OF VULVAR DISEASE

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Cells that become tumorigenic undergo an epithelial-to-mesenchymal transition (EMT), which is often characterized by a loss in epithelial cadherin (E-cad) and a gain in vimentin expression. These changes are linked with a more aggressive cancer phenotype therefore E-cad and vimentin have become prominent markers in determining the stage of some cancers. Our studies show treatment of the vulvar cancer cell line, A431, with either dexamethasone or clobetasol, results in loss of E-cad and gain of vimentin expression. This is of particular concern because clobetasol and other ultrapotent corticosteroids are commonly used in the treatment of the vulvar disease, lichen sclerosus. Our studies are now examining if the loss of E-cadherin and gain of vimentin expression are commonly seen in vulvar cancer from patients previously diagnosed with lichen sclerosus and treated with clobetasol.

PALLADIUM CATALYZED REACTIONS: A SEARCH FOR A GREENER OXIDATION PATHWAY

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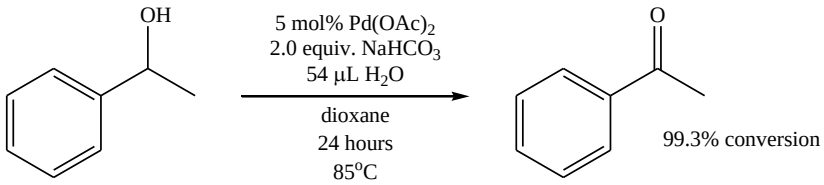
One of the standard reactions used to generate aldehydes and ketones is the direct oxidation of alcohols. Many current synthetic methods for completing these reactions have significant disadvantages for large-scale manufacture such as the use of stoichiometric amounts of heavy metals, hazardous reagents, and solvent-intense extractive work-ups. In light of this, our research is focused on developing a mild and green oxidation method that could be implemented at large scale. Our efforts focused on the oxidation of 1-phenylethanol to acetophenone. This research sought to minimize the formation of the side product ethyl benzene and attain high conversions consistently using palladium catalysis. Various amounts and types of reagents were tested for their effect. The most successful reaction conditions were:



High conversions were only achieved by blanketing the reaction with argon for an hour and then removing the argon hose to allow the reaction mixtures to vent. According to GC/MS, the reaction achieved 99.3% conversion and produced only trace amounts of the side product ethyl benzene. This reaction method was also applied to other alcohols. Future research will focus on understanding the mechanism of this reaction, further experimentation with different alcohols and development of a simple extractive work-up method.

A QUALITATIVE ANALYSIS OF THE NEW YORK FOOD & AGRICULTURAL RELATED INDUSTRY

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This qualitative and descriptive study explores existing and future opportunities for agriculturally related economic development, training and education within and among MCC divisions and educational partners. Twenty-one self selected participants from 20 different food and agricultural businesses from upstate New York participated in a strengths, weaknesses, opportunities and threats analysis in order to identify, controllable and uncontrollable factors within the food and agricultural related industry. Discussion was recorded, transcribed and analyzed using NVivo 8 software. Factors identified include: quality and profitability, capacity to attract workers, education, public perceptions, government regulations, and supply and demand for New York products. The study concludes that involvement and coordination within and among the industry will be required to: 1) account for public misinformation, 2) attract a labor force with a broad range of skills, 3) educate youth about career opportunities, 4) establish an industry wide skill set inventory and 5) mitigate government regulations. An implication is that consumer demand and a strong natural resource bases suggests strong fundamentals for regional growth in the Rochester area.

INVESTIGATION OF THE LEWIS ACID CATALYTIC ABILITIES OF TUNGSTEN (IV) COMPOUNDS ON THE ESTERIFICARTION OF FATTY ACIDS

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The use of fatty acid methyl esters (FAME), commonly known as biodiesel, as an alternative to traditional diesel fuel has grown tremendously and many researchers are investigating the use of low quality used cooking oils as a raw material for their production. However, these oils are often contaminated with high levels of free fatty acids (FFA) requiring conversion to esters before the conventional base catalyzed transesterification can be preformed. Often this is accomplished with sulfuric acid, which is highly corrosive and may lead to premature reaction vessel failure. We originally began investigating the catalytic abilities of tetrachloro[ethylenebis(diphenylphosphine)]tungsten(IV) as a replacement for sulfuric acid. However, the direction of the project has recently changed as an interest in the effect of how different ligands on tetrachlorobis(triphenylphosphine)tungsten(IV) changes the electron density at the metal center, and consequently its Lewis acid character. We have been replacing triphenylphosphine with triphenylphosphine species that have fluorine, chlorine and methoxy groups in the ortho position on the benzene ring. In order to determine the Lewis acidity of these compounds we have used them to catalyze the methylation of oleic acid. As in past work, the reaction progress was monitored via ^{1}H NMR. Results to date indicate that the compound with the fluorine substituted benzene ring is the strongest Lewis acid due to its electron withdrawing nature while the non substituted compound is the weakest.

PHYLOGEOGRAPHIC STUDY OF CTENOSAURA SIMILIS

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This project is designed to ascertain the phylogeographic relationships of the large iguanid lizard species Ctenosaura similis throughout its entire range from Panama north to southern and eastern Mexico. Preliminary mitochondrial DNA data from the cytochrome b gene from population samples of 50+ populations have indicated significant genetic structure within and among populations. In order to testwhether the mitochondrial haplotype structure is the result of ancestral polymorphism or current interbreeding among populations We will be sequencing a nuclear gene locus (rhodopsin - ~900bp fragment) in addition to adding cytochrome b sequence from additional samples. Results from the rhodopsin data analysis can then be compared to those from the mitochondrial data and tests performed to resolve the genetic structure as a result of one of the two very different population dynamics. If the mitochondrial and nuclear data sets agree, there may be enough evidence to describe separate populations as newly recognized species, while discordance between the data sets can indicate current levels of gene exchange too high for taxonomic recognition of more than a single species.

CLU1P REGULATES MITOCHONDRIAL MORPHOLOGY AND MITOCHONDRIAL DNA STABILITY

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Mitochondria are cellular organelles that generate ATP via the process of respiration. They form reticular structures in actively growing yeast cells. Mitochondria have their own genome that encodes genes needed for the final stages of respiration. The mitochondrial DNA (mtDNA) is bound with proteins to form a structure called a nucleoid. These nucleoids are distributed within the mitochondrial structures. In humans, mutations in mtDNA lead to a variety of neuromuscular and neurodegenerative disorders. The focus of this study is to determine the role of Clu1p in maintaining mitochondrial morphology and mtDNA stability. Our studies support the altered mitochondrial morphology previously described in *clu1Δ* mutants. Additionally, we observed *clu1Δ* mutants to have wild-type nucleoid structures and segregation patterns. We show that *clu1Δ* cells have a higher frequency of respiration loss than wild-type. This may be a direct result of a 4-fold increase in spontaneous point mutations observed in *clu1Δ* mutants versus wild-type cells. *clu1Δ* cells also display an increase in new non-respiring mutants subsequent to UV exposure, without a difference in viability relative to wild-type cells. We propose that modest alterations of the mitochondrial structure do not affect nucleoid structure or segregation, however, they do affect mitochondrial DNA replication and/or repair synthesis.

SYNTHESIZING OXIDATION-RESISTANT LIGANDS FOR C-H AMINATION CATALYSTS

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A variety of ligand syntheses were attempted using the same method. p-Toluenesulfonic acid monohydrate was used to activate 1,1,3,3-tetramethoxypropane, which was added to an aniline in a solution of toluene. This was followed by the work-up step of adding Na_2CO_3 to neutralize the solution, resulting in the formation of the desired compound, which could then be coordinated to iron to form the ligand. Attempted anilines included 2,6-dichloroaniline, which formed $L^{HCl2}H$ with a 16.5% yield and was then coordinated to iron bromide; 2,4,6-tri-tert-butyl-aniline, to form the product which was unable to be purified ; and 9-aminoanthracene, which resulted in no reaction.

SPATIOTEMPORAL VARIATION IN FATTY ACID SIGNATURES OF LAKE MICHIGAN SPOTTAIL SHINER *Notropis hudsonius*

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The pelagic food web of Lake Michigan has been the main focal point of ecological studies because of the importance of commercial and sport fisheries in this oligotrophic system. However, recent introductions of non-native species, mainly dreissenid mussels (zebra mussel *Dreissena polymorha* and quagga mussel *Dreissena rostrisformis*) and round gobies (*Neogobius melanostomus*), have altered trophic ecology directing more attention to the coastal (nearshore) areas. Still these coastal zones have been understudied, especially the assemblage of the recently altered nearshore food web. To better understand the resulting changes to the nearshore trophic structure in Lake Michigan, fatty acid signatures (FAS) of spottail shiner *Notropis hudsonius*, a prey fish for many fish species, were analyzed from eleven sites around Lake Michigan (Wisconsin, Illinois, Indiana, and Michigan) pertaining to two habitats (rocky or sandy) and three seasons (spring, summer, and fall). Unlike diet analysis of stomach contents, FAS provide insights into longer term feeding habits of consumers based on the degree of similarity between their FAS and those of their prey. Using multivariate statistics, we found differences in FAS among groups demonstrating the heterogeneous character of spottail shiner feeding throughout Lake Michigan and the importance of FAS analysis as a tool to explore feeding ecology of freshwater fish.

FREQUENCY AND CHARACTERISTICS OF LAKE BREEZE CIRCULATIONS IN THE GREAT LAKES REGION

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Great Lakes lake-breeze circulations, which occur most often during the spring and summer months, can have large economic, societal, and climatic impacts on coastal regions. Although lake breezes are mesoscale weather phenomena, they can significantly modify the summer climatic conditions in the Great Lakes coastal regions by frequently providing cooler temperatures several 10s of kilometers inland from lake shorelines and have been found to be important contributors to initiating severe thunderstorms. Lake breezes have also been shown to influence the dispersion of atmospheric pollutants in lake coastal regions and the local transport of nuisance airborne biota between the shoreline and inland agricultural areas.

An objective method was developed to identify the occurrence of lake-breeze events in the Great Lakes region using surface climatological data. The method also demonstrated the important ability to distinguish non-lake-breeze events; a problem experienced by previous studies. For this presentation, the lake-breeze climatology in the vicinity of Lake Michigan will be discussed. The Lake Michigan climatological analyses indicated that lake breezes tended to occur more frequently along the eastern shore of Lake Michigan than along the western shore. On average, a maximum number of lake-breeze events occurred during August at each location. This maximum is most closely associated with weaker monthly average wind speeds. Even though the air–lake temperature difference, ΔT, provides the local forcing for the development of the lake-breeze circulation, large temperature differences are not required. Nearly 70% of all events occurred with a daytime maximum ΔT ≤ 12°C. In addition, noteworthy differences in the position of synoptic-scale sea-level pressure and wind fields with respect to Lake Michigan were found to occur during eastern, western, and both-shore lake-breeze events. Results and methods used for this study will be shown and discussed during the presentation.

METHYL ESTER PRODUCTION OF OLEIC ACID CATALYZED BY TIN(II) BROMIDE

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Biodiesel can be produced from a variety of oils including virgin and used cooking oil. Transesterification is typically employed to process virgin oils, but for used oils an acid catalyzed pre-esterification reaction needs to be performed in order to convert the free fatty acids that are present. This reaction is usually catalyzed with a strong Bronsted base like sulfuric acid but, Lewis acids, such as the tin(II) halides can also effect this transformation. The catalytic ability of these compounds is being investigated to determine if there is a trend depending on which halogen is present. In this research the efficiency of tin(II) bromide as a catalyst was studied. Reactions were run at different temperatures, and the rate of methyl ester formation was determined using ^{1}H NMR. Using this data, the activation energy of the reaction catalyzed by tin(II) bromide was determined to be 68.9 kJ/mol.

FERROXIDASE ACTIVITY OF THE MULTICOPPER OXIDASE FET5 FROM S. CEREVISIAE

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A significant link has been established between the regulation of iron homeostasis and a class of metalloenzymes known as multicopper oxidases. This research seeks to develop a deeper understanding of metallobiochemistry through the purification and characterization of the multicopper oxidase Fet5p from the baker's yeast *Saccharomyces cerevisiae*. Fet5p is directly involved in the oxidation of iron(II) and thereby the mobilization of iron stores from the yeast vacuole. A new strategy has been implemented incorporating the plasma membrane ferroxidase Fet3p, a paralog to Fet5p, which has been truncated to secrete from the yeast cell. An expression vector containing an inactive form of FET3 fused to FET5 allowed for the successful secretion of functional Fet5p. Currently, attempts to separate the fusion and obtain purified Fet5p are underway as well as kinetic characterization of the intact chimera.

POSSIBLE TREATMENT OF TYPE II DIABETES USING *S*-SUBSTITUTED-*N,N*-DIMETHYLDITHIOCARBONATES

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Diabetes is a disease that affects 25 million Americans. Approximately 90-95% of these cases are type II diabetes. It has been found that this disease is directly linked to an over activity of protein tyrosine phosphatase 1B (PTP1B), which dephosphorylates the multiple tyrosine residues within the insulin receptor (IR) protein. This dephosphorylation prevents insulin from binding to the receptor site, thus ultimately increasing the blood glucose levels. Current treatments for this disease focus on decreasing the glucose concentration in the blood, but do not directly address the underlying problem. Through previous research within our lab, it has been concluded that *S*-substituted-*N,N*-dimethyldithiocarbonate molecules may inhibit the PTP1B enzyme, further controlling diabetes. Thus far, we have synthesized a few such compounds, some of which have been sent to CSIRO in Australia to attempt a co-crystallization with the PTP1B enzyme. All new compounds will be evaluated as inhibitors of the PTP1B in-house.

GLUTATHIONE PEROXIDASE AS A RISK FACTOR IN CORONARY ARTERY DISEASE

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Oxidative stress plays a central role in the pathogenesis of atherosclerosis. Antioxidant enzymes like glutathione peroxidase (GPX1) are essential for protection against oxidative stress. A polymorphism in the gene that encodes GPX1 (rs1050450) results in a proline>leucine amino acid substitution that may affect the activity of the variant proteins. We hypothesize that GPX1 genotype is a major determinant of enzyme activity in whole blood and that enzyme activity is correlated with risk for coronary heart disease. Study participants were recruited from patients undergoing clinically indicated PET-MPI to measure cardiac perfusion. Genomic DNA was isolated from whole blood using the Maxwell 16 robotic system. Analysis of genotypes was conducted through PCR amplification of the target GPX1 gene, restriction digest of the gene and gel electrophoresis. Patient genotype was compared with disease state and other clinical risk factors for coronary artery disease. Future work will determine the effect of genotype on enzyme activity.

PLANETARY ECCENTRICITY INCREASE WITH DISTANCE AND TIME

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Beyond Neptune the eccentricity of orbital objects significantly increases with distance (2009 RASNY Fall Meeting). The eccentricity eventually reaches the critical value of 1.0 at about 300AU (4.6E+10 Km), where the elliptic orbits will change to hyperbolas. This observation predicts that planets leave the Solar system when they reach the limiting distance. In this presentation, this observation is quantitatively modeled and a physical explanation for the increase of eccentricity with increasing planetary orbits is suggested.

The model is based on the interaction of the gravitational fields of the Sun and the Milky Way galaxy. Previously a quantitative model was presented for the rate of the decrease of the solar gravitational field with time. This loss is caused by solar mass and gravity loss by radiation and solar wind.
With time the solar gravitational field decreases relative to the gravitational attraction of planets by the Milky Way. It is shown that the increasing power of the galactic gravitation is expanding planetary orbits near the galaxy, which eventually breaks the adhesion of the planets from the solar system. On the opposite side of the Sun, the gravitational forces of the Sun and the galaxy combine to enhance the planetary adhesion. The result is an increase of ellipticity of planetary orbits which increases with distance from the Sun.

The experimental and model results preclude the existence of an Oort cloud beyond the limiting escape distance.

MOLECULAR PHYLOGENETIC RECONSTRUCTION OF THE NEOTROPICAL CUCUMBER GENUS *GURANIA*

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Gurania are a genus of monoecious flowering Neotropical vines that are found in Central and South America. Early in their life, vines produce male flowers and climb into the rainforest canopy. Once they reach a certain size and age, vines begin to produce female flowers in pendulous inflorescences. *Gurania* serve as hosts to fruit flies in the genus *Blepharoneura* where as many as seven different species of flies may parasitize a single species of *Gurania*. Because of the specificity of *Blepharoneura* flies to their host plant, it is likely that diversification of the plant hosts influences the diversification of the flies. Currently, there is no clear picture of host plant phylogeny. Taxonomic revision based on morphology of hosts has been attempted, but geographical variation within species has led to difficulties in species definitions and no phylogenetic analysis has been completed. Our work is aimed at reconstructing a phylogeny of the genus *Gurania* based on molecular data. Preliminary comparison among chloroplast DNA regions has indicated little divergence suggesting that *Gurania* species are closely related. As a result, phylogenetic reconstructions require the analysis of multiple, rapidly evolving gene regions. Our work is geared toward the identification of useful gene regions for phylogenetic reconstruction in *Gurania*. We are testing eight chloroplast intergenic spacers that have proven useful in phylogenetic reconstruction of *Gurania's* sister genus, *Psiguria*, as well as a low-copy nuclear marker. Using leaf samples collected in the field, we have extracted, amplified, and sequenced seven chloroplast intergenic spacers: *rpoB-trnC, trnS-trnG, ndhF-rpl32, psbE-petL, ndhC-trnV, psbM-trnD,* and *psbZ-trnM*; and one low-copy nuclear marker: *serine/ threonine phosphatase* (*s/t phos*). Pairwise comparisons of these sequences reveal 0.22-2.26% sequence divergence among the *Gurania* species suggesting that while *Gurania* are closely related, sufficient variation exists for phylogeny reconstruction. Parsimony and maximum likelihood-based phylogenetic analysis of chloroplast intergenic spacers from multiple species of *Gurania* will be presented.

MULTIDIMENSIONAL FLUORSCENCE AND CHEMOMETRIC ANALYSIS OF THE PHENOLIC CONTENT OF HUMIC MATERIAL

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Dissolved Organic Carbon (DOC), a component of humic material, is a natural pollutant that has been shown to be increasing in natural waters. Under conditions of climate change, the phenolic portion of the humic material may be increasing at an even faster rate. DOC, and specifically its phenolic content, can be a concern for the chlorination of natural waters for drinking water. Such treatment can produce potentially dangerous disinfection byproducts via reactions from the DOC/phenol. The primary goal of this project is to characterize the DOC in natural waters in regard to its phenolic components. To this end, multidimensional fluorescence spectroscopy with chemometric analysis has been applied to humic samples. Parallel factor analysis (PARAFAC) has been employed to characterize the phenolic portion of the DOC and correlate characteristic components to phenol structure.

DETERMINATION OF THE EFFECTS OF ENDOSULFAN-ALPHA ON TRANSCRIPTS KNOWN TO REGULATE PRIMORDIAL GERM CELL MIGRATION IN ZEBRAFISH

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Various compounds found in the environment have been shown to alter normal endocrine function by disrupting cellular signaling pathways; these compounds are collectively called Endocrine Disrupting Compounds (EDCs). Many substances, from plastics to pesticides, are thought to have endocrine disrupting capabilities that often target developing embryos, specifically the nervous and reproductive systems. Because of the high level of conservation of genes and proteins across animals from the Chordate phylum, Zebrafish have been used for these studies. In vertebrates, Primordial Germ Cells (PGCs) develop during embryogenesis, migrate to and take up residence in the position of the future gonad, and eventually give rise to the future gametes. PGCs have specific and specialized behaviors with regards to cell fate specification, differentiation, and migration. PGC control over RNA transcription regulates these behaviors making them an attractive target in elucidating the mechanisms associated with EDC exposure and altered PGC migration in the Zebrafish. Specifically, when Zebrafish embryos are exposed to endosulfane-alpha during the first 24 hours after fertilization the normal migration pattern of PGCs is altered. However, the underlying changes that result from endosulfane-alpha exposure are unknown. Therefore, the effects of endosulfan-alpha on *deadend, staufen 2,*and *cxcr-4* were examined by exposing Zebrafish embryos (2-2.5 hours-post-fertilization [hpf] to 24 hpf) to 0.1 µM endosulfane-alpha. Total RNA was isolated from Zebrafish embryos, converted to cDNA, and transcript levels for *deadend, staufen 2,* and *cxcr-4* were determined using Real-Time PCR. Results demonstrated that environmentally relevant doses of endosulfan-alpha reduces *deadend* to 81.7% while it increases *cxcr-4* to 116% of control values; results for *staufen 2* remain inconclusive due to a problem in the real-time PCR amplification. The alteration in PGC transcript levels may begin to explain the mechanism(s) that underlies altered PGC migration in Zebrafish embryos following early endosulfane-alpha exposure.

THE EFFECTS OF LAKE MICHIGAN ON MATURE MESOSCALE CONVECTIVE SYSTEMS

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Mesoscale convective systems (MCSs), or organized regions of thunderstorms that produce widespread severe wind and rainfall, are ubiquitous features across the central and eastern United States during the warm season (April–September). Many of these MCSs traverse the Great Lakes and pose an important forecasting issue. Conventional wisdom suggests that mature MCSs might dissipate upon crossing lake waters that are typically cooler than the surrounding land. However, observational evidence reveals that MCSs can persist or even intensify upon crossing these relatively cool lake waters. This presentation will document environmental and lake conditions associated with warm-season MCSs that cross Lake Michigan to ascertain the spectrum of conditions under which lake-crossing MCSs persist and dissipate.

Of the 110 coherent MCSs that crossed Lake Michigan during the warm seasons of 2002–2007, 47 (43%) persisted, while 63 (57%) dissipated. Persistence was favored during July and August, when Lake Michigan was warmer and during the evening and overnight, when the low-level jet stream was most intense. However, a number of MCSs also persisted during the early warm season when the Lake Michigan water temperature was cooler than the surrounding land. In addition, MCSs often persisted in the equatorward-entrance region of a strong upper-level jet stream and in association with large amounts of Convective Available Potential Energy immediately downstream of Lake Michigan.

Numerical simulations were conducted for representative case studies with Lake Michigan included (control) and removed (noLM). These studies showed that the aforementioned synoptic-scale environmental conditions were the main control on MCS persistence and dissipation. Within a favorable synoptic-scale environment, both persisting and dissipating noLM MCS simulations produced up to 50 mm of additional precipitation in conjunction with increased convection and instability. However, once the synoptic-scale environment became unfavorable, both control and noLM simulated MCSs dissipated simultaneously.

IDENTIFICATION AND CHARACTERIZATION OF L,L-DIAMINOPIMELATE AMINOTRANSFERASE (DAPL) IN *VERRUCOMICROBIUM SPINOSUM* DSM 4136

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Verrucomicrobium spinosum is a recently identified bacterium belonging to the new division of bacteria Verrucomicrobia. The bacterial phylum Verrucomicrobia is of growing interest due to its widespread distribution and unusual host associations. *Verrucomicrobium spinosum* sequences have been identified in aquatic and soil habitats along with the gastrointestinal tract of humans. The bacterial genome of *V. Spinosum* has recently been sequenced. A close and specific relationship between *V. Spinosum* and *Chlamydiae* in both phylogenetic trees and uniquely shared inserts in protein sequences is highly suggestive that *Verrucomicrobia* may be the closest free-living relatives of the parasitic chlamydiae, the organism responsible for the common sexually transmitted disease Chlamydia. (Griffiths, 2007). Here we propose that based on highly conserved sequencing contained within its genome, *V. Spinosum* utilizes the L,L- diaminopimelate aminotransferase (DapL) pathway for DAP/lysine biosynthesis. The enzyme catalyzes the formation of L,L-diaminopimelate (L,L-DAP) from *L*-2,3,4,5-tetrahydrodipicolinate (THDPA) in one step. Since the DAP/lysine biosynthesis pathway is used to make lysine along with peptidoglycan, which is used to form the mesh-like structure in cell wall, it follows that inhibition of DapL would result in bacterial death. Given the fact bacteria often develop resistance to commonly used anti-biotics overtime, the search for novel anti-bacterial targets and medicines is always of keen interest.

NUMBER CURVES; A NEW WAY TO DO ARITHMETIC

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Motivation: As a physics teacher I see a mismatch between the arithmetic and calculus that we use to analyze physical events (exact, almost crystalline) and the physical events themselves (shaggy, frictional, complicated flexing shapes, etc.). Scientists and engineers solve this mismatch by using simplified models to smooth out the real world events to fit the mathematical techniques. Can we instead make the arithmetic more "adjustable" or "compliant" so that 2+2 need not always equal exactly 4 but instead adjusts to fit the event? Could this yield a different way to analyze physical problems? Arithmetic and the natural numbers are intuitively obvious. Is this blinding us to a more general form of arithmetic? I hope that this effort might lead to a generalization of arithmetic somewhat similar to the development of non-Euclidean in geometry in the early 1800's.

Number Curves: Addition of real numbers may be viewed as a geometrical operation on a number line constructed with straightedge and compass. Points associated with the integers are evenly spaced along the line using the compass. Points for rational numbers are identified using geometric constructions. The operation C=A+B identifies the point of intersection of the number line and the circle centered at the point for A of radius equal to the distance from points 0 to B. Why not use this same geometrical operation for number curves that don't follow a straightedge, or that have the numbers associated with the points in some other way? I use the symbol "&" for this operation. Unlike probabilistic techniques, number curves yield exact solutions.

Number curves have some well behaved properties: 0 is always the identity element for the "&" operation on any number curve. The "&" operation always has a solution which is commutative and associative for all numbers whenever the curve is a straight line or a circle.

And some not-so-well-behaved properties: Depending on the shape of the curve, C=A&B can have multiple solutions, or no solution at all. I've demonstrated that the "&" operation is never commutative nor associative for all numbers if the curve is not a straight line nor a circle. I've got algorithms to determine exact solutions to A&B for several special cases but they are all difficult to solve explicitly.

Big goal: I'm hoping that number curves might generalize arithmetic in much the way that geometry was generalized to its non-Euclidean form in the early 1800s. This might lead to new methods of analyzing physical events whereby the math can adjust to accommodate the event instead of the event being simplified to accommodate the math.

ESTERIFICATION OF FREE FATTY ACIDS IN OLEIC ACID FOR BIODIESEL SYNTHESIS USING LEWIS ACID TIN (II) IODIDE.

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Biodiesel is a commonly used alternative fuel source and is readily produced from renewable resources such as used cooking oil. Biodiesel can be synthesized through esterification of free fatty acids (FFA) or tranesterification of triglycerides. Because used oils are often contaminated with FFA's we have chosen oleic acid as a model system for investigating reactions that convert FFA into methyl esters. An acid catalyst is used to treat the FFA's and create fatty acid methyl esters (FAME). Tin halides are common Lewis acid catalysts and are readily available. We tested the effectiveness of the tin (II) halides (F, Cl, Br, and I) to determine which is the best catalyst to use in biodiesel synthesis and monitored the reaction progress using ^{1}H NMR. This poster will present my methods and results on the use of Tin (II) Iodide to catalyze the methylation of oleic acid.

CHO-K1 CELL EXPOSURE TO 'ENVIRONMENTALLY SAFE' SIMPLE GREEN AND 2-BUTOXYETHANOL HAS AN ALARMING EFFECT IN CELL VIABILITY

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Simple Green is a cleaning product used primarily in the household and claims to be environmentally safe. 2-Butoxyethanol is the only listed chemical in Simple Green with an established exposure limit. The question at hand is how environmentally safe is Simple Green, what effects does it have on cultured cells? Chinese hamster ovary cells of the K-1 strain (CHO-K1) in multi-well plates were exposed to 0%, 0.1%, 1.0% or 10% Simple Green for 10 minutes, and were kept at a temperature of 37°C and a pH of 7.2. A measure of cell viability was taken using a crystal violet assay to bind the DNA of live cells and a spectrophotometer was utilized to measure absorbency at 570nm. Cell viability followed a linear path as the concentration of Simple Green was increased. We observed: 2.4% viability at [10%], 49.5% at [1.0%], and 77.1% at [0.1%] when compared to the control culture. According to the data received when plated on mammalian tissue cells, even a 1:100 dilution of Simple Green caused 97.6% of cells to die when compared to control treatments. Sunshine Makers Inc.'s claim to be environmentally safe is not supported by the data observed and this raises the question of 'What effect does this "environmentally safe" product have on other cells and microorganisms?

DIMERIZATION OF BENZYLAMINE WITH SULFUR MONOCHLORIDE

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The direct dimerization of primary amines to form secondary amines has yet to be reported. We have developed a novel process by which benzylamine reacts with sulfur monochloride to initial form the dibenzylamino disulfide, which subsequently fragments and dimerizes to form *N*-benzylidenebenzyl-amine. Reacting the imine with $NaBH_4$ yields the dibenzylamine final product. In addition, we have begun to react the imine with various carbanions to make unsymmetrical disubstituted amines.

SYNTHESIS OF ISOFLAVONE DERIVATIVES USING A NOVEL METHODOLOGY

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Isoflavones are a class of organic compounds that act primarily as antioxidants. Isoflavones are produced almost exclusively by the members of the bean family including soybeans, tofu, peanuts, chick peas, and alfalfa. The antioxidant characteristics that isoflavones exhibit help hinder the progressions of certain cancers, primarily breast, prostate, and colon cancer. This research is based on a three/four step synthesis to complete a library of isoflavone derivatives. The synthesis involves an enamine addition, a ring closure and halogenation, a Suzuki coupling, and finally a demethylation to obtain the isoflavone of interest. This synthesis shows the efficiency and effectiveness of the pathway used in producing the desired isoflavone.

DESCRIPTION OF A JUVENILE SPECIMEN OF *DEINONYCHUS ANTIRRHOPUS* (THEROPODA, DROMAEOSAURIDAE) WITH COMMENTS ON ONTOGENETIC VARIABLE CHARACTERS WITHIN THIS TAXON AND OTHER RELATED FORMS

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After a comparative study of all available material of *Deinonychus antirrhopus* in the AMNH, MCZ, MOR, and YPM collections, we refer the small theropod specimen MCZ 8791 to this taxon. It is a juvenile based on the presence of only a single line of arrested growth (LAG) in the left radius, the decreased interdigitation on the sutural edge of coracoids, the remnant of a layer of highly vascularized cortical bone on the lateral surface of the centrum of a caudal vertebra, the articular surfaces of the centrum of the proximal caudal vertebrae being perforated by numerous small foramina, only partially ossified parapophysis, and incomplete development of cortical bone on the articular. As to cranial characters, the maxillary tooth count of MCZ 8791 is higher than that in the more mature specimen YPM 5232; other possibly pertinent, diagnostic, juvenile, cranial characters observed in the course of this study include characters in perinate specimens of other members of related taxa such as the posterolateral expansion of the frontal, and a rod-like lacrimal. Relative to the measurements taken from comparable limb elements on the more mature specimens as well as anticipated proportions that might have been estimated from simple extrapolations from the larger specimens, the measurements of the medial/lateral widths of some of these juvenile limb elements are relatively smaller than would have been expected. The resulting effect of such proportional differences indicates a more gracile body form relative to that of individuals within later growth stages. Compared with homologous YPM skeletal elements, the forelimbs are elongate and the coracoids are disproportionately robust. Some of these characters are present only at an early growth stage or have transformed into a differing state as this taxon approaches maturity. These characters have been designated as age variable characters (AVC). After observing the condition of some of these AVCs in *Bambiraptor*, the presence and morphological state of these AVCs may not only help to determine the maturity of a given specimen within this taxon but may also have some application to the determination of the growth stages of specimens within other closely related taxa.

TRANSCRIPTIONAL PROFILING OF [PSI+] CELLS UNDER STRESSFUL ENVIRONMENTAL CONDITIONS

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Prions are infectious, self-propagating, aggregated particles devoid of nucleic acid which are composed entirely of abnormally-folded proteins. They are examples of epigenetic protein inheritance. Mammalian prions cause fatal neurodegenerative diseases like Creutzfeldt–Jakob disease (humans) and bovine spongiform encephalopathy (cattle).

Yeast prions model some aspects of mammalian prions and allow for extensive studies of basic mechanisms involving prion-cell interactions. We are using the [PSI+] yeast prion which is a epigenetic modifier of translation termination fidelity resulting in nonsense suppression. [PSI+] is a self-perpetuating amyloid-forming conformation of the eRF3 protein and is coded for by the Sup35 gene. The overall goal is to determine whether the presence of a prion protein in a cell affects the mRNA types and levels present in the cell. Transcriptional (mRNA) profiles were obtained using microarrays. Previous work had not shown large (2x) changes in mRNA when the cells were grown in rich YPD media. Studies by others have shown that the presence of the [PSI+] prion modulates colony morphology and survivability in a variety of (stressful) growth conditions. Our studies were done in minimal medium containing ornithine, a poor nitrogen source, in an attempt to induce stress in the cells. Microarrays done comparing the transcriptional profile of [PSI+] growing in YPD versus ornithine minimal media showed many transcriptional changes many of which were 2x or greater. When the transcriptional profiles of [PSI+] growing in ornithine minimal medium was compared with that of [psi-], several significant two-fold mRNA changes were observed. These results suggest that the effects of a prion protein on a cell's transcriptional profile may be manifested more in stressful medium conditions. The observed mRNA transcriptional differences may help answer what effect a yeast prion protein has on a cell.

SEQUENCE AND CHARACTERIZATION OF THE MANDUCA SEXTA NADPH TRANSHYDROGENASE

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Many insects require the hormone 20-hydroxyecdysone for molting. This hormone is synthesized by a P450 enzyme which requires NADPH. A potential source for the production of NADPH is the mitochondrial transhydrogenase that catylzes the following reaction:

$$NADPH + NAD^+ \leftrightarrow NADP^+ + NADH$$

We report here the sequencing of the transhydrogenase gene from the model insect *Manduca sexta*. The coding region of the gene spans a region of about 16 kb and encodes a protein with high homology to transhydrogenase enzymes from a number of species.

ILLUSTRATED KEY TO THE ISOPODS OF NEW YORK

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We are developing an illustrated key to the isopods of New York State. Our approach contrasts with the dichotomous, text-based couplets of existing keys by using an illustrated diagnostic pathway to identify isopod species. Drawings prepared by the senior author illustrate differences in structure, body form, and pattern.

A STUDY OF THE ATMOSPHERIC COMPONENTS OF A WETLAND'S WATER BUDGET: WOODLAWN BEACH STATE PARK, NEW YORK.

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As part of an ongoing hydrologic characterization study of a 15-acre wetland within Woodlawn Beach State Park, just south of Buffalo, NY, this study focuses on the atmospheric inputs and outputs of a wetland's water budget. Properly representing the atmospheric output of evapotranspiration is a key component in the balancing of a wetland's dynamic water budget. However, the methods to calculate evapotranspiration vary considerably. This research seeks to compare these various methods, from the basic to the complex, with the goal to determine if long, elaborate calculations are really necessary, or if simple approaches produce agreeable results. Using an assemblage of collected meteorological data from on site weather stations, numerous evapotranspirational equations were calculated for the 2010 and 2011 spring, summer, and early fall seasons. In addition, two in-field physical instruments, a Class A pan and an atmometer, were also used to mimic evaporation rates and were compared to the calculations. In addition to examining evaporational measurements, this study also investigates the atmospheric input of precipitation and how it, combined with evapotranspiration, influences the balancing of a water budget. Precipitation is further explored through the monitoring of rainfall pH and the exploration of the potential impacts acid rain within the system.

X-RAY PHOTON CORRELATION SPECTROSCOPY FROM METAL SURFACES

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X-ray Photon Correlation Spectroscopy(XPCS), the extension of dynamic light scattering from optical to x-ray regimes, has provided a marvelous tool for examining nature on the nano-scale. XPCS has been successfully used in the past to study surface dynamics, and recently been extended to structures as small as surface reconstructions and atomic terraces. However, the extreme requirements of both high coherence and surface diffraction seriously constrain current study to high Z surfaces with relatively slow dynamics on the scale of 1 - 10^4 seconds. We will discuss, in broad terms, some of the current experiments near and at this signal to noise boundary. Some of the experiments have proven successful, such as observing step-flow motion on Pt (001) [1] or dynamics of the lifting of the Au (001) surface reconstruction at high temperature [2], while other applications have proven elusive with current light sources. Once this border is relaxed, study will shift to a much wider range of surfaces and materials that can exhibit faster timescale dynamics. In particular, future possibilities of XPCS from surfaces will include real environments, such as materials synthesis, catalysis, and phase transitions.

[1] M.S. Pierce, et al. Applied Physics Letters **99**, 121910 (2011).
[2] M.S. Pierce, et al. Physical Review Letters **103**, 165501 (2009).

RATES OF DEUTERIUM EXCHANGE OF AN ACIDIC C-H SULFONE

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The exchangeability of acidic protons with deuterium atoms is a well known phenomenon. This is typically associated with alcohols, amines, and carboxylic acids. However, depending if a lowered pKa exists, it is possible to exchange a C-H to C-D. With our system, we examined the exchangeability of methylene protons which are alpha to both a benzenesulfone and a carboxylic acid. The rate of exchange was examined in different solvents, and we have also shown that substituents on the benzenesulfone can alter the rate of exchange.

PSEUDO-POLYELECTROLYTES: MULTILAYERS AND APPLICATIONS

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The use of weak polyelectrolytes in multilayer polymer systems provides a means of altering the physico-chemical properties of these thin films. We have examined the limits of the polyanions by incorporating the pseudo-polyelectrolytes (pPE), poly(4-vinylphenol) (PVPh), into multilayer systems with either the weak polyelectrolyte (WPE), poly(allylamine hydrochloride) (PAH) and the strong polyelectrolyte (SPE), poly(diallyldimethylammonium chloride) (PDADMAC) from dilute aqueous media. Since PVPh exhibits moderate antimicrobial ability, we tested these newly developed multilayered systems to determine their ability to act as antimicrobial surface coatings. For the PDADMAC/PVPh multilayered coatings, >70% inhibition of growth of *S. epidermidis* was observed at an assembly pH of 10.5 and 11.0. In addition, we have been able to exploit the lowered pKa of the alcohol, poly(norbornenyl hexafluoroisopropylmethyl alcohol) (HFIPA), and successfully multilayer with both PAH and PDADMAC. These films are remarkable thick and are considered board-line superhydrophobic.

TRANSITORY REGIME OF FERROFLUID ELECTROSPRAYS

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Although electrospray is much investigated, particularly in relation to its use in mass spectrometry, the electrospray of ferrofluids is hardly ever mentioned in the literature. We investigate here a transitory regime of oil-based ferrofluids. The fluid contains superparamagnetic ferric oxide (10 nm nominal size) particulates. Ferrofluids are electrosprayed in air at atmospheric pressure in a needle-plate configuration. Spray patterns offering a visual spatial distribution of the spray droplets were observed at the grounded counter-electrode under positive polarity. Under certain electrospray parameters the ferrofluid generates lobes in a sequential form. Transitions from one lobe to another are taking place spontaneously due to instabilities in the spray. The pure liquid carrier of the ferrofluid was also electrosprayed for comparison but the patterns observed do not match those of the ferrofluid. The reported lobe regime was so far observed only on the oil-based ferrofluids, although water-based ones were also tested.

THE DETERMINATION OF THE MICROENVIRONMENT WITHIN A BIODEGRADABLE POLYMER FILM USING COUMARIN C153

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Biodegradable polymers (BPs) are used extensively in the medical field for surgical sutures, reconstructive implants and drug delivery. With respect to drug delivery, it is important to know the potential microenvironment surrounding BP encapsulated drugs. This surrounding microenvironment could have negative effects, such as denaturation, and render the drug ineffective. The purpose of this experiment is to determine the microenvironment surrounding Coumarin (C153) as a function of BP formulation composition. C153, a fluorescent reporter molecule, acts as our 'model drug' and is encapsulated in BP blends of Poly (L-Lactic Acid) (PLLA) and Pluronic P104. Using fluorescence spectroscopy, BP thin films doped with C153 are analyzed. It was determined as the PLLA molecular weight is increased the C153 emission intensity increases. This result indicates higher levels of fluorophore encapsulation in formulations of higher PLLA molecular weight. In addition, the C153 emission maxima shifts blue as PLLA concentration increases within the blends. This blue shift indicates that C153 is sensing a more polar microenvironment. From these results we can determine that levels of drug loading are dependent on polymer molecular weight. Furthermore, there is a direct relationship with microenvironment polarity and formulation composition. The results from this work can aid in the development of custom tailored BP platforms for use in controlled drug delivery applications.

A SPITZER VIEW OF THE GIANT MOLECULAR CLOUD MON OB1/NGC 2264

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We present Spitzer mid-infrared and far-infrared images of the Mon OB1 giant molecular cloud, which contains the young star forming region NGC 2264 and several sub-clusters of young stellar objects (YSOs). With the Spitzer data, along with 2MASS photometry, we classify YSOs in the entire Mon OB1 giant molecular cloud (GMC) by their infrared-excess emission and study their distribution with respect to cloud material. We find that in regions with higher spatial YSO and molecular gas density there is a strong correlation between local surface density of YSOs and density of molecular gas as traced by dust. This correlation is roughly described as a power law in these quantities. We use a number counting technique to determine the fraction of cloud members which are YSOs for different portions of the cloud that have differing average extinctions. We find that this disk fraction differs between the NGC 2264 region alone and the other regions of the Mon OB1 GMC. We compare these results with other molecular clouds and contrast our results for the NGC 2264 region with other estimates in the literature which use a different YSO classification approach.

NOVEL PSEUDO-POLYELECTROLYTES IN MULTILAYERED THIN FILMS

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Multilayering with a pseudo-polyelectrolyte (pPE) changes the chemical interactions within the system more so then those made from weak polyelectrolytes (WPE) or strong polyelectrolytes (SPE). To date, there are only two known pPE that have been multilayered. We have been able introduce another pPE's, into this blossoming field, poly(4-vinylbenzene boronic acid) (PVBBA). As with previously reported pPE's, only a very narrow range of assembly pHs were accessible when multilayered with both the WPE, poly(allylamine hydrochloride) (PAH), and the SPE, poly(diallydimethylammonium chloride) (PDADMAC). In addition, we have begun to examine the WPE, poly(4-vinylbenzoic acid) (PVBA). Multilayered systems for PVBA were produced at pHs 6, 7, 8, 9, 10, and 11 and a linear growth in absorbance readings with increasing layer number was observed. This latter system will help us understand multilayered films created with our newly developed pPE, poly(4-vinylperbenzoic acid) (PVPBA); in which the systems has the potential of producing a strongly antimicrobial surface.

PH AND TEMPERATURE DEPENDENCE OF DIFFUSION THROUGH A SOL-GEL MATRIX: A STUDY UTILIZING ETHYL-VIOLET DYE REVERSIBILITY

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Sol-Gel matrices have multiple applications, including thermal insulation, biochemical sensing and membrane simulation. With the intention of studying the pH and temperature effects of diffusion across a membrane, sol-gel was utilized as a medium for this study. Addition of ethyl-violet dye to the matrix provided a UV-visible light emission that could be analyzed by ultraviolet-visible spectroscopy. Its pH-dependent color reversibility made ethyl-violet ideal. Under basic conditions (pH 10), ethyl-violet is violet in color, while under acidic conditions (pH 2), it is light blue in color. Initially, the sol-gel sample was exposed to an acidic buffer solution (pH 2) for a period of one hour, during which the absorption was analyzed by Ultraviolet-Visible spectroscopy in five minute intervals. Afterward, the same process was repeated with a basic buffer solution (pH 10). From the acquired data, the diffusion rates of acid and base through the matrix were determined. The diffusion of base was found to be higher than acidic diffusion at temperatures above 25°C. Diffusion of acid was observed to be independent of temperature (constant), whereas diffusion of base was dependent. The activation energy for acid penetration was determined to be 0 kJ/mol, while the activation energy for the base penetration was 34.2 kJ/mol.

TEMPERATURE AND pH DEPENDENCE OF DIFFUSION THROUGH A SOL-GEL MATRIX; A STUDY UTILIZING ETHYL-VIOLET DYD REVERSIBILITY

Jisu Ryu, Kazushige Yokoyama, Dan J Mark, Jocelin M Kalish
SUNY Geneseo, Department of Chemistry, Geneseo, NY 14454

The ethyl-violet dye encapsulated sol-gel was studied for biochemical sensing and membrane simulation. Under basic conditions (pH 10) ethyl-violet is violet in color, while it is light blue in color under acidic conditions (pH 1). Initially, the sol-gel sample was exposed to an acid buffer solution (pH 2) for a period of one hour, during which the absorption was analyzed by ultraviolet-visible spectroscopy in 5-minute intervals. Afterward, the same process was repeated with a basic buffer solution (pH 10). From the acquired data, the diffusion rates of acid and base through the matrix were determined. The diffusion of base was found to be higher at temperatures above 25 C. Diffusion of acid was observed to be independent of temperature (constant), whereas diffusion of base was dependent. The activation energy for acid penetration was determined to be 0 kJ/mol, while the activation energy for the base penetration was 34.2 kJ/mol.

NMR CHARACTERIZATION AND MECHANISTIC IMPLICATIONS OF SINGLET OXYGEN ADDITION TO THE VITAMIN B_6 RING

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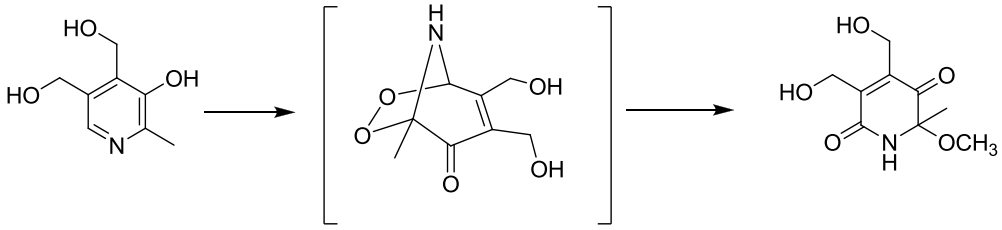
Vitamin B_6 is a group of interconvertible vitamers that are versatile cofactors in biological systems. Recently, vitamin B_6 was also shown to have a secondary, protective effect against singlet oxygen. As an antioxidant, it quenches cellular reactive oxygen species that have been implicated in neurodegeneration and aging. Although vitamin B_6 is well defined as a cofactor, its antioxidant mechanism still remains poorly understood. In a series of time-course NMR experiments, we observed novel intermediates and products of B_6 oxidation. Using the photosensitizer Rose Bengal, we generated singlet oxygen to replicate pyridoxine-dependent quenching in phosphate buffered solutions. Periodic 1D and 2D NMR show the formation of two stable intermediates and a well-characterized, isolatable product. A low temperature study of the same reaction in methanol also revealed an unstable bicyclic endoperoxide intermediate that converted to a 2,5-dipyridone upon warming. The oxidation of other B_6 vitamers; pyridoxal and pyridoxal-5-phosphate were similarly characterized in aqueous buffer by time-course NMR directly from reaction mixtures. Compared to other 3-hydroxypyridines, these oxidations appear to be unique to the B_6 vitamer family. The oxidation mechanisms of pyridoxine and other B_6 vitamers will be discussed.



COMPARISON OF METHODS DETERMINING NITRATE CONCENTRATION IN STREAM WATER

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This study sought to compare three tests used to determine nitrate concentration in stream water samples. The methods explored included nitrate reduction, using the YSI 9500 field photometer and Perkins-Elmer Lambda 25 lab spectrometer, and the ultraviolet spectroscopy screening method. The average variance, standard error, and range were calculated for each method. In addition, the calibration curves were compared to determine which had the most linear correlation, in accordance with Beer's Law. The exact accuracy of the methods could not be determined due to any variation there may have been between the actual and expected concentration of the standards. However, inferences could be made about the accuracy. In addition, the variability of the measurements between four duplicates allowed the determination of the relative precision of the methods.

ANALYSIS OF CYTOTOXICITY IN HEPG2 CELLS

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The hepatocellular carcinoma cell line HepG2 often used as a model system to study liver cell toxicity upon exposure to various xenobiotics. This poster describes our progress in two distinct areas of study: cytotoxic effects of alcohol and the cytotoxic effects of canthardin analogs. Currently, the nature of cytotoxicity in liver cells exposed to ethanol is unclear as well as the proposed 'health benefits' associated with the components of red wine, particularly resveratrol. While the link between alcoholism and liver dysfunction is well established, this study aims to more closely examine the molecular basis of the effects of ethanol within liver cells. Secondly, we have evaluated the cytotoxicity of canatharidin, a known anticancer agent, as well the effects of several cantharidin analogs.

ION-PAIRING OF THE IONIC LIQUID 1-HEXYL-3-METHYLIMIDAZOLIUM BIS(TRIFYL)AMIDE IN CHLOROFORM

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In prior research, long-lived ion-pairing of the Ionic Liquid (IL) 1-ethyl-3-methyl-imidazolium bis(trifyl)amide (**1**) has been observed in chloroform at dilute concentrations as evidenced by two sets of resonances in the ^{1}H spectrum (J. Sol. Chem. Vol. 33, 2004, 381-394). This study focuses on 1-hexyl-3-methylimidazolium bis(trifyl)amide (**2**) that contains a longer side chain (hexyl versus ethyl) and does not exhibit two resonance sets. The objective of this study was to determine if ion pairing was still present in chloroform solutions of (**2**) despite only having one ^{1}H NMR resonance set. Therefore, we explored the effect of temperature and concentration on the self diffusion coefficients of cation and anion measured by ^{1}H and ^{19}F Diffusion Ordered Spectroscopy (DOSY). Viscosity measurements are also obtained to use the Stokes-Einstein relation to determine the effects of temperature and concentration on the effective radius size of the species in solution. Experimental results clearly indicate the formation of ion-pairs and higher aggregates.

WATER QUALITY ASSESSMENT OF TWENTY-EIGHT STREAMS IN THE CATSKILLS BASED ON BENTHIC MACROINVERTEBRATES

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During the years 1972 to 2002, the New York State Department of Environmental Conservation (DEC) sampled numerous streams and rivers in an effort to determine and record the water quality in locations throughout the state. The information available is based on macroinvertebrate data collected at over 1,500 sites across the state. This allowed for some temporal trend analysis showing that levels of impairment decreased over time. This research project was conducted to determine how the water quality of 28 specific sites within the Delaware drainage basin has changed within the past nine years since the DEC data was published. Following the methods of the DEC, the travelling-kick sample method was used to collect macroinvertebrates for identification and counting. The data was then used to prepare a Biotic Index, EPT index, and PMA index for each sample site. The research demonstrates that, overall, impairment levels of the sample sites have increased.

MACROPHAGE APOPTOSIS IN ADVANCED ATHEROSCLEROTIC LESIONS INDUCED BY 7-KETOCHOLESTEROL AND IRON ASCORBATE

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Cardiovascular diseases are the cause of 38 percent of deaths in North America and are predicted to be the primary cause of death globally within the next 15 years. The progression of atherosclerotic lesions is due to inflammatory stimuli, subsequent release of various cytokines, smooth muscle cell proliferation, connective tissue matrix synthesis, and the accumulation of macrophages and lipid. Monocytes that are recruited to the sites of early lesions differentiate into macrophages due to the presence of lipoproteins in the extracellular matrix. The buildup of apoptotic macrophages eventually leads to secondary necrosis causing the accumulation of cellular debris, the promotion of inflammation, plaque instability, acute thrombosis and myocardial infarction in coronary artery disease. We hypothesize that two pro-inflammatory components of advanced lesions, 7-ketocholesterol and free iron, both promote macrophage apoptosis. The human acute monocytic leukemia cell line THP-1 was used as a model system to study the role of redox-active iron and 7-ketocholesterol in macrophage apoptosis. Apoptosis induced by 7-ketocholesterol and iron ascorbate in THP-1 monocytes and macrophages was measured by flow cytometry and enzyme-linked immunosorbent assay (ELISA). Expression of genes that function in apoptosis was measured by quantitative real-time PCR. The results suggest that both 7-ketocholesterol and iron ascorbate cause apoptosis in differentiated THP-1 macrophages in a concentration and time dependent manner. However preliminary results suggest that the apoptotic pathways may be different. Future experiments will investigate the expression of interleukins and other apoptotic markers to clarify the mechanisms of iron- and oxysterol-induced apopotosis.

NITROGEN AND PHOSPHORUS RESORPTION EFFICIENCY RATIOS VARY WITH STAND AGE IN NORTHERN HARDWOODS

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Trees mobilize and reabsorb nutrients from leaves prior to senescence, which is an important mechanism of nutrient conservation. Traditionally, terrestrial systems have been thought to be primarily nitrogen limited, but recently observation and theory have indicated co-limitation by multiple elements. In 2009 we sampled leaves in August and leaf litter in October at the Bartlett Experimental Forest in northern New Hampshire (American beech, sugar maple, yellow birch, white birch, red maple). We studied three stands in each of three age classes: 21-26, 33-36, and >100 years. Phosphorus resorption efficiencies tended to be higher in older stands than younger stands. We analyzed the ratio of N:P resorption, which controls for variation in mass loss during senescence. Phosphorus resorption relative to nitrogen was significantly greater in older stands for white birch ($p = .004$), red maple ($p = 0.01$), and American beech ($p = 0.06$). The fact that old stands are resorbing higher proportions of P than N suggests greater limitation by P in older stands.

"A STEPPINGSTONE OF CIVILIZATION": THE HOJACK SWING BRIDGE AND STRUCTURES OF POWER IN MONROE COUNTY

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This paper examines the Hojack Swing Bridge, the 1905 railroad swing bridge at Charlotte, and its role in the creation and mediation of structures of power in the region. We first discuss the general design and mechanics of swing bridges, the history of the Hojack railroad in the region, and the effect of the railroad on industrial development in the region. We then demonstrate how the very location and design of the Hojack Swing Bridge was the result of competing power relations between the railroad company and other interests. We close with a brief discussion of the bridge today and its uncertain future, an uncertainty linked to competing power relations in the present.

AVOIDANCE OF HEAVY METALS BY TERRESTRIAL ISOPODS

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Isopods are sensitive to organic and inorganic pollutants, and might be useful species for bioassays. Laboratory trials have shown that a terrestrial isopod (*Porcellio scaber*) avoids soil to which copper sulfate has been added. Those trials did not address the question of whether the isopods were detecting Cu^{2+} ions or an organocopper complex formed by a reaction between organic chemicals in the soil and the copper that was added. That distinction is critical for evaluating the potential of isopods for use in bioassays, because different soils will form different organocopper complexes. We tested the ability of *Porcellio sp.* to differentiate between filter paper moistened with solutions of copper sulfate and filter paper with sodium chloride of the same osmolal concentrations. The isopods avoided the copper solutions, indicating that they are able to detect Cu^{2+} ions.

DISRUPTION OF BACTERIAL SIGNALING BY BEEHIVE PLANT RESINS

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Propolis, also known as 'bee hive sealant,' is a natural product of honeybees used to seal cracks and openings and provide some immune defense in the hive. Humans have also used propolis for centuries to treat disease, protect wounds, and boost the immune system. Our laboratory has recently shown that propolis has an inhibitory effect on bacterial quorum sensing (QS) systems, a chemically based communication system used by many pathogenic bacteria to coordinate population wide phenotypic changes including virulence. The goal of this project is to measure the effects of twelve geographically different propolis samples (collected from U.S.A., Brazil, Turkey, and Hungary) using bacterial bioreporters in a multi-well plate format that can measure the QS regulated phenotype in biosensors strains along with the cell density. Our data is consistent with and further supports our previous studies that propolis contains compounds that disrupt bacterial QS. Since pathogenic bacteria use QS to regulate virulence traits, propolis can be used in future investigations to isolate anti-QS compounds. Such compounds can be used as anti-pathogenic molecules to control diseases caused by bacteria.

SURVEY OF BACTERIA IN LAKE ONTARIO

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Monthly water samples were collected from six different locations in Lake Ontario over the summer of 2011 to isolate and characterize antibiotic resistant bacteria. Samples were taken from near a treated sewage outflow pipe and where the Genesee River enters the lake. Water temperature and clarity were measured for each sample location. Water samples were filtered to collect bacteria and the resulting filtrate was grown on R2A medium. Bacterial colonies were isolated and pure cultures frozen and stored for future analysis. Subsequent research will evaluate the gram character and antibiotic resistance to five clinically–relevant antibiotics of the isolated bacteria.

PUTTING ZEBRA MUSSELS TO THE TEST. CAN THIS INVASIVE SPECIES BE EXPLOITED FOR GOOD?

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Zebra Mussels (*Dreisenna polymorpha*) are an abundant and problematic invasive species that are prevalent in our freshwater lakes. These small bivalves have the capacity to be very efficient water column filters, and this ability can in principle be harnessed in water treatment facilities as "green" biological filters because they have the ability to trap small particles and expel them as pseudo-feces. Our experiments were used to determine the percent survival of treated zebra mussels in different concentrations of detergents/surfactants and salts both at critical micelle concentration and below. The combination of salts and surfactants has the potential to trap small toxins in these micelles, which could also be expelled as pseudo-feces. Our results demonstrate the conditions that mussels cannot tolerate in both the detergent and the salt treatments independently. Triton X-100 and SDS caused adverse effects in the mussels when the concentration was high. The detergents reacted with their internal membranes and caused massive cell membrane damage, causing them to die. The higher concentrations of the two magnesium salt treatments also caused the mussels to die. This may be due to the metal ions interference with the osmoregulation of the mussel. In conclusion, these treatments provide a baseline for tolerance for the different concentrations of detergents and salts.

THERMOLYTIC FRAGMENTATION OF SUBSTITUTED DIBENZYLOXY DISULFIDES

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Dialkoxy disulfide derivatives have been shown to undergo thermolytic decay. The rate of degradation of para-substituted benzyloxy disulfide molecules seems to differ according to the substitutions they possess. The decomposition of these molecules has been shown to follow Swain and Lupton's constant. We took a more in depth look at why these molecules behave the way they do under thermolytic conditions. We investigated the thermo-stability of these molecules in the presence of electron withdrawing and electron donating groups. They were synthesized and subjected to heat using the TGA and DSC.

AGGREGATION PHEROMONES OF ISOPODS

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Pheromones are chemicals that are released by an organism and affect the social behavior of another organism of the same species. *Oniscus asellus*, a terrestrial isopod, is normally found in groups. We tested the hypothesis that pheromones play a role in this aggregation, and compared the responses of male and females to pheromones from individuals of the same sex and the opposite sex. We placed single isopods in Petri dishes that contained two shelters, one resting on clean filter paper and the other on pheromone-impregnated filter paper, and recorded the location of the isopod after 12, 24, 36, and 48 hours. We tested four combinations of pheromone source and isopod sex: Female pheromone x female isopod, female pheromone x male isopod, male pheromone x female isopod, and male pheromone x male isopod. In all of those combinations isopods selected the shelter with the pheromone-impregnated paper ($p < 0.003$ in all cases, binomial test with the probability of selecting the pheromone-impregnated paper set at 0.5).

STEROLS AS MOLECULAR BIOMARKERS FOR FEEDING STRATEGIES IN REEF BUILDING SCLERACTINIAN CORALS

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Scleractinian corals build the carbonate framework of coral reefs, and are critical to the ecology and health of reef ecosystems. These reef building corals obtain nutrients through feeding on zooplankton and also from their symbiotic photosynthetic zooxanthellae. Global climate change, ocean acidification, and human impacts are all stressing these fragile coral ecosystems and many corals may not be able to adapt to these rapid environmental changes. We are developing molecular biomarkers as tools to determine the feeding strategies of individual coral colonies in different environments, and as the chemistry and temperature of the ocean continues to change, corals may adjust their feeding strategies to obtain enough nutrients, and energy to survive. We measured the abundance of specific organic molecules, namely sterols, to establish the feeding behaviors of corals by comparing their relative abundances in the coral host with that in their symbionts. We analyzed two coral species, *Montastraea faveolata (M.fav)* and *Porites astreoides* (*P.ast)*, from a range of depths and reef habitats in the Florida Keys. We measured significant differences in sterol composition between the two coral species that may be related to differences in production or genetic variability. The sterol distribution of *M. fav* colonies growing in deeper waters did not reflect the composition of zooxanthellae suggesting a greater reliance on feeding to obtain their sterols. This molecular level approach to understanding feeding strategies now allows us to follow adaptations of reef building corals as the oceans change.

FOOD NUTRITION IMPACTS FITNESS OF *DAPHNIA* SPP. (FRESHWATER MICROCRUSTACEAN) EXPOSED TO ACUTE UV-A (320 – 400NM) RADIATION

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In nearly all of Earth's ecosystems, organisms are being forced to develop mechanisms that will increase their fitness (survival and reproduction) in response to global climate change. Studies of the physiological and behavioral responses of freshwater organisms to temperature and solar ultraviolet (UV) radiation are highly variable (species, conditions, extremes of stressors, etc). It is well known that UV can induce significant stress in some organisms, including direct DNA damage, reduced reproduction rates, and death. Organisms in freshwater systems such as lakes and ponds are faced with high levels of UV exposures due to the clear water. *Daphnia*, a freshwater microcrustacean, is found in many freshwater ecosystems in nearly all climates thus making it a model organism for understanding the effects of UV radiation on a freshwater population.

The fitness response to acute UV-A exposure was studied in the model freshwater microcrustacean, *Daphnia* spp. Various species of *Daphnia* are raised on different food sources and then exposed to UV-A. This provided a picture of how nutrition and UV radiation play a role in survivorship and reproduction in *Daphnia* populations. Some species of *Daphnia* and a sister species, *Ceriodaphnia dubia*, tolerated UV-A radiation and different food sources and had high levels of survivorship and reproduction. Other species were negatively affected by different food sources and in addition, UV-A radiation leading to poor survivorship and reproduction.

Analysis of food sources may provide a better understanding of how organisms can cope with environmental stressors (improved nutrition), despite the rapid changes that can occur in their habitats. These findings can be extended to other populations and should be taken in to consideration for climate change models.

SELF ASSEMBLY OF AMYLOID BETA PEPTIDE OVER DISULFIDE FUNCTIONALIZED NANO GOLD COLLOIDAL PARTICLES

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A key step in fibrillogenesis of amyloid β protein (Aβ) causing Alzheimer's disease is a formation of an oligomer intermediate under a reversible process. While it is challenging to extract this oligomer form, the Aβ coated gold nanoparticles were found to prepare this oligomer form with a help of a specific nanosurface potential. In order to further clarify the role of nanoscale surface, the surface of gold colloid was functionalized with a series of dialkoxy disulfides and self-assembly of $A\beta_{1\text{-}40}$ peptide was investigated under a collaboration with Dr. Priefer at Niagara University. As pH was externally altered between pH 4 and 10, phenyl-bezyilic dialkoxy disulfide functionalized gold exhibited a quasi reversible color change, implying that it has a great potential of controlling a reversible self-assembly process. However, no reversible colour changes were observed for nitro-, chloro-bezyilic dialkoxy disulfide functionalized gold colloids.

MODELING FROST LINE SOIL PENETRATION USING FREEZING DEGREE-DAY RATES, DAY-LENGTH, AND SUN-ANGLE

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Seasonal soil freezing depth varies from year-to-year and knowledge of frost line depth and progression is critical to a number of applications. Frost depth was measured using a CRREL-Gandahi frost tube over a period of three years (2008-2011). The frost tubes provided a measure of frost depth to verify model outputs, and were installed at two locations: Buffalo, NY (Buffalo State College) and in a residential yard in North Tonawanda, NY. With the exception of one set of frost tubes, the area around each frost tube was routinely cleared of snow. Freezing degree-days were calculated from nearby weather stations. A model was developed to forecast the progression and depth of the frost line based on freezing degree-day rates (FDD/day), with adjustments for day-length and sun-angle. The frost line model proved itself a simple-to-use model that required easily obtained inputs, and provides excellent agreement with measured values. The model is best used to predict frost depths in areas and times where snow cover is absent, or when potential frost depth maximums are to be determined.

EYE-TRACKING NOVICE AND EXPERT GEOLOGIST GROUPS IN THE FIELD AND LABORATORY

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Experience in the field is a fundamental aspect of geologic training, however, there have been only a few quantitative studies based on large data collection efforts to investigate how geologists learn in the field. We are using an Active Vision approach to learn how novices and expert geologists acquire visual information in the field. The Active Vision approach emphasizes that visual perception is an active process wherein new information is acquired about a particular environment through exploratory eye movements. Eye movements are not only influenced by physical stimuli, but are also strongly influenced by high-level perceptual and cognitive processes. Eye-tracking data were collected on ten novices (undergraduate geology students) and 3 experts during a 10-day field trip across California focused on active tectonics. In addition, high-resolution panoramic images were captured at each key locality for use in a semi-immersive laboratory environment. Examples of each data type will be presented. The number of observers will be increased in subsequent field trips, but expert/novice differences are already apparent in the first set of individual eye-tracking records, including gaze time, gaze pattern and object recognition. We will review efforts to quantify these patterns, and development of semi-immersive environments to display geologic scenes. The research is a collaborative effort between Earth scientists, Cognitive scientists and Imaging scientists at the University of Rochester and the Rochester Institute of Technology and with funding from the National Science Foundation.

THE PHOTOPROTECTIVE PROPERTIES OF VITAMIN D3: A BIOCHEMICAL STUDY OF VITAMIN D UPTAKE BY DAPHNIA (MICROCRUSTACEAN)

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Environmental variability can have significant impacts on natural populations to the point that some organisms may have difficulty adapting. Increased levels of ultraviolet radiation (UVR) on the earth's surface have been shown to have a wide range of effects on organisms, from no impact to lethality. Recent studies have shown benefits of vitamin D to individuals, primarily vertebrates, exposed to increased levels of solar radiation. *Daphnia* spp. are especially sensitive to environmental stressors, particularly UVR, and their rapid adaptation to these stressors is crucial. It is known that Vitamin D can increase the fitness (survival and reproduction) of *Daphnia* spp. This research focuses on the impact of UVR on freshwater microcrustacean, *Daphnia* spp., and the potential protective properties of vitamin D_3 in this genus. It is hypothesized that vitamin D_3, or its primary metabolite (25-hydroxyvitamin(OH)D_3,) will also have photoprotective properties in the *Daphnia.* Juvenile (pre-reproductive) *Daphnia* spp. were exposed to vitamin D_3 (0, 5, or 10mg / 100mL) and UV-A (320-400nm; 6.912 kJ/ m^2) for 72 hours, methanol extracted, and analyzed using High Performance Liquid Chromatography (HPLC) to quantify vitamin D_3 and 25(OH)D_3 in the *Daphnia,* the algae (*Selenastrum capricornutum),* and the freshwater synthetic growth media. The quantity of vitamin D_3 and 25(OH)D_3 in the *Daphnia* were then correlated to their overall fitness (survival and total reproduction) in a separate experiment. Increased concentrations of vitamin D_3 directly correlate with increased survival of *Daphnia* spp. with UV-A exposure, but not clearly with reproduction. Studies continue to determine if other vitamin D_3 metabolites may play a greater role in the fitness of the *Daphnia* spp. with changes in UVR. Further, food web studies of various algae and *Daphnia* spp. are being investigated to determine the photosensitivity and photoprotective properties of the vitamin D_3 in natural systems.

EVALUATION OF ENDOTOXIN REMOVAL TECHNOLOGIES

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Endotoxins are very stable molecules that are resistant to high temperature and extreme pH levels and easily invade media and reagents such as water, saline and buffers. In the NBC/PPA Mid-Scale Production group, protein requests are increasingly made requiring lower and lower endotoxin amounts (measured in EU/mg protein) for use in in-vivo pre-clinical studies. Endotoxin level was measured throughout a typical antibody manufacturing process, and various commercially available technologies were evaluated at different steps of protein purification with the goal of identifying a recommended technology to remove the contaminant. Endotoxins, small molecules present in bacterial membranes, pose a risk of contamination in biological products. If not cleared during the manufacturing process, tissue injury, fever, septic shock or death can occur if injected into mammals. With both clinical and commercial manufacturing, steps and technologies must be developed to clear this impurity from pharmaceutical products. Here, commercially available technologies are evaluated and compared for pre-clinical protein production.

DETECTING PATHOGEN POPULATIONS IN THE RHIZOSPHERE COMMUNITIES OF TOMATO PLANTS

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In an aim to improve soil borne disease management in an organic agricultural system, mixed-species cover crops were tested to see their effect on pathogen prevalence in the tomato rhizosphere. Several different species of cover crops have been shown to suppress disease, but suppression has not been tested in mixed-species. This mixed species study covers three states (NY, MD, and OH) and three cover crop mixtures were used: hairy vetch with rye, clover with rye, and turnip with rye. Rye alone and no cover crop were used as the two controls. Plants were harvested, and the height and the fresh weight of each plant was recorded. DNA isolation and soil analyses were completed. Macroarrays, used to detect plant pathogens, are pre-spotted with oligonucleotides which hybridize with complementary PCR-amplified DNA labeled with a chemiluminescent reporter. The fungal and oomycete specific oligonucleotide sequences used will hybridize to the membrane when the same sequences are present. The macroarrays used in our lab can detect over forty tomato pathogens. My project focused on macroarrays from the state of Maryland that were collected in a single season. Nineteen oligomers, representing 7 pathogens were identified in the 59 samples tested. In the future, the type and frequency of pathogen will then be related to the type of cover crop for each sample, to determine if there are any cover crop effects.

ANALYSIS OF DRINKING WATER FOR TRIHALOMETHANES BY MEMBRANE- INTRODUCTION-GC-MS

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Chlorination is one of the most widely used drinking water disinfection process in the world, however it forms halogenated disinfection by-products (DBPs), such as trihalomethanes (THMs). The concentration of THMs is regulated by the USEPA because it is a suspected carcinogen. Currently the maximum contaminant level concentration for THMs is 80 $\mu g\ L^{-1}$. The USEPA has four GC-based methods for the detection of THMs in drinking water. These methods provide acceptable results however they require organic solvent and expensive sampling equipment. This research involved automating an alternative membrane-based GC-MS method, which was solvent free for the extraction of THMs. The sampling apparatus used in this research is comprised of a membrane sampling device coupled to a two position injection valve fitted with a 250mL sample loop contained in a heated enclosure interfaced to a typical GC-MS. Several parameters, such as purge time and injection port temperature were optimized. Studies were also performed to determine a suitable internal standard for the developed method. Drinking water samples collected at The College at Brockport, SUNY contained total THM concentrations between 50 to 60 $\mu g\ L^{-1}$.

BIOMONITORING OF ELLICOTT CREEK

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Ellicott Creek is a significant drainage for the northern suburbs of Buffalo and has been impacted by human activities. A 2001 NYSDEC survey showed moderate to slight impacts. We report on a summer 2011 survey we conducted collecting data for macro-invertebrates, as well as chemical and physical parameters (temperature, oxygen, ANC, conductivity, and total phosphorus). Our results confirm that Ellicott Creek shows some slight impacts in the Williamsville region, consistent with the NYSDEC data.

INHIBITION TESTING OF *PSEUDOMONAS* SPP. "K/W" AGAINST *PYTHIUM APHANADURAMTUM* PA5 ON *CUCUMIS SATIVUS*

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Pseudomonas spp. have been studied as biological control agents for plant pathogenic soil fungi and bacteria, due to the production of antibiotic compounds such as 2-4-diacetylphloroglucinol (DAPG). *Pseudomonas* spp. strain "K/W" was isolated on the SUNY Oswego campus and has been found to inhibit growth of plant pathogenic fungi: *Pythium aphanidermatum* Pa5 and *Pythophthora caprici* on Potato Dextrose agar. K/W was also able to inhibit Gram-positive bacteria, such as *Staphylococcus aureus* and *Bacillus cereus*, but shows no inhibition for Gram-negative bacteria, such as *E. coli*. A mutant strain, CA-B, was generated by transposon mutagenesis and mapped to the *phlD* gene (which produces 2-4-diacetylphloroglucinol (DAPG)). This mutation renders CA-B incapable of inhibiting growth of bacteria or fungi. To study direct interspecific competition between the K/W strain and *Pythium*, a bioassay was developed using *Cucumis sativus* seeds, to quantitate the ability of the K/W strain to inhibit the pathogenicity of *Pythium*. Results of the bioassay are presented.

ECOSYSTEM BUDGETS HAVE NO ERROR: A PROGRESS REPORT ON QUANTIFYING UNCERTAINTY IN FOREST ECOSYSTEM STUDIES (QUEST)

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Nutrient budgets for forested ecosystems have rarely included error analysis, in spite of the importance of uncertainty to interpretation and extrapolation of the results. We describe recent progress in quantifying uncertainty in biomass, soils, and hydrologic inputs and outputs, using examples from the Hubbard Brook Experimental Forest, NH, USA. Uncertainty derives from natural spatial and temporal variation and also from knowledge uncertainty in measurement and models. For example, when estimating forest biomass, researchers commonly report sampling uncertainty but rarely propagate the uncertainty in allometric equations used to estimate biomass, much less the uncertainty in the choice of which allometric equations to use. Change over time may have less uncertainty than a single measurement, if measures are consistently biased, as by the use of inaccurate allometric equations or soil sampling techniques. Promoting quantification of uncertainty in ecosystem studies is the mission of QUEST (quantifyinguncertainty.org).

ELECTRON MICROSCOPY STUDY OF THE AMYLOID BETA PROTEIN ON THE SURFACE OF COLLOIDAL NANOPARTICLES

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Our research involves the investigation of the nanoscale aggregation of the Amyloid Beta Protein (A-β_{1-40}) under interfacial conditions. A-β_{1-40} is involved in the process of fibrillogenesis, a known characteristic of Alzheimer's disease. Through research of the reversibility of the A-β_{1-40} aggregated conformation, it may be possible to find a process to reverse Alzheimer's disease in its early stages. We succeeded in characterizing microscale properties of A-β_{1-40} coated 20 nm gold and silver colloids by using Transmission Electron Microscopy (TEM) for various pH conditions. This study enabled us to determine the behavior of A-β_{1-40} as seen through its interaction with colloid nanoparticles.

THE IMPACT OF THE LIGAND ON PALLADIUM-CATALYZED HYDRODECHLORINATION OF ARYL CHLORIDES

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Efficient hydrodechlorination of aryl chlorides is of interest both for its potential application to removing chlorine substituents from environmental pollutants such as polychlorinated biphenyl compounds (PCB's) and for its utility in synthetic organic chemistry. The past ten years have seen the development of new, commercially available and air-stable ligands for palladium to give catalysts that readily react with aryl chlorides in the presence of nucleophiles, resulting in replacement of the chlorine by the nucleophile. The work described here builds on previous work in which a palladium catalyst prepared from one of these ligands, a dialkylphospinobiphenyl compound, was used with formate ion, a hydride source, to efficiently and effectively hydrodechlorinate aryl chlorides in refluxing methanol. In the current work, the same reactions were performed using recently published, more sterically encumbered ligands and precatalysts prepared from them, to determine which were more effective catalysts for the hydrodechlorination of aryl chlorides. Dialkylphospinobiphenyl ligands in which the alkyl group was the cyclohexyl and the *tert*-butyl were compared in this work. The reactions were monitored by gas chromatography to determine both the extent and rate of hydrodechlorination. Studies were also conducted to determine the impact of temperature and mole ratio of the reactants on the hydrodechlorination reaction.

PRODUCTION AND CHARACTERIZATION OF POLY-3-HYDROXYBUTYRATE FROM BIODIESEL-GLYCEROL BY *BURKHOLDERIA CEPACIA* ATCC 17759

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Glycerol, a byproduct of the biodiesel industry, can be used by bacteria as an inexpensive carbon source for the production of value-added biodegradable polyhydroxyalkanoates (PHAs). *Burkholderia cepacia* ATCC 17759 synthesized poly-3-hydroxybutyrate (PHB) from glycerol concentrations ranging from 3% to 9% (v/v). Increasing the glycerol concentration resulted in a gradual reduction of biomass, PHA yield and molecular mass (M_n and M_w) of PHB. The molecular mass of PHB produced utilizing xylose as a carbon source is also decreased by the addition of glycerol as a secondary carbon source dependent upon the time and concentration of the addition. ^{1}H-NMR revealed that molecular masses decreased due to the esterification of glycerol with PHB resulting in chain termination (end capping). However, melting temperature and glass transition temperature of the end-capped polymers showed no significant difference when compared to the xylose-based PHB. The fermentation was successfully scaled up to 200 L for PHB production and the yield of dry biomass and PHB were 23.6 g/L and 7.4 g/L, respectively.

USE OF MIRCROWAVE IRRIADIATION AND SOLID SUPPORT REAGENTS IN FRIEDEL-CRAFT ALKYLATION REACTIONS

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Microwave chemistry is a popular method in organic synthesis to achieve higher yields in shorter reaction times. The theory behind the technique is that the radiation given from the microwave is converted into heat, allowing it to produce a "superheating" site where reactions can be performed in a matter of seconds/minutes compared to hours. Another relatively recent technique used in organic chemistry is solid support reagents. The benefits of this approach is that upon completion of a reaction, a simple filtration can be performed which expediates the work-up and produces less organic waste. Friedel-Craft alkylation has been explored using microwave chemistry as well as solid-support bound reagents, however never in combination. We have begun to evaluate the use of varying alkylation reagents with both $AlCl_3$ and Si-$AlCl_x$ as the catalysts under microwave irradiation. These reactions conventionally take 24 hours, but they went to completion in only 5 minutes when place in the microwave.

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