

**Northeast Regional  
Undergraduate and Graduate Student  
Sigma Xi  
Poster Conference**



**SUNY-Oswego, Oswego, NY**

**April 18th, 2009**

## Schedule

- 9:15 to 10:15 AM, arrival, set up, and breakfast snacks, Sheldon Hall Ballroom;
- 10:15 AM to 11:15 PM, (Session 1) poster session, judging, and networking, Sheldon Hall Ballroom;
- 11:25 AM to 12:25 PM, (Session 2) poster session, judging, and networking, Sheldon Hall Ballroom;
- 12:30 to 1:30 PM, lunch and networking, Sheldon Hall Lower Lobby;
- 1:30 to 2:30 PM, lecture “The quantum identity crisis: Bose-Condensation and beyond” by Nicholas P. Bigelow, Lee A. DuBridge Professor of Physics and Chair Professor of Optics, Senior Scientist, Laboratory for Laser Energetics, Quantum Optics and Quantum Physics, University of Rochester, in Sheldon Hall Ballroom;
- 2:30 to 3:00 PM poster awards; Sheldon Hall Ballroom;
- 3:00 PM, Sigma Xi members and officers, selection of a new location for the next year’s conference, discussion of the NE regional Sigma Xi, meeting with the national Sigma Xi Executive Director, Dr. Jerry Baker, Sheldon Hall Ballroom.

## Participating and \*Collaborating Institutions

Albert Einstein College of Medicine  
Binghamton University  
Cornell University  
Fairfield University  
Green Mountain College  
The Graduate Center, CUNY  
Hamilton College  
Hobart & William Smith Colleges  
Ithaca College  
Le Moyne College  
Lehman College, CUNY  
\*Ludwig Institute for Cancer Research  
\*Medical University of Vienna  
New York State Museum  
\*Oakwood University  
Queens College, CUNY

Quinnipiac University  
Roswell Park Cancer Institute SUNY Albany  
SUNY Dutchess Community College  
SUNY Oswego  
SUNY Plattsburgh  
SUNY Purchase  
Stony Brook University  
\*Texas A&M University  
\*Universidade Federal de Mato Grosso do Sul  
\*Universitat Keil Medical School  
University of Albany  
University of Massachusetts Lowell  
University of Rochester  
\*University of Illinois at Urbana-Champaign  
Union College  
\*Washington and Lee University  
\*Yale University

## Organizers

Kestas Bendinskas, Fehmi Damkaci,  
Shashi Kanbur, Ampalavanar Nanthakumar,  
SUNY Oswego Sigma Xi Chapter

## Judges

Fehmi Damkaci- Chief Judge  
Leigh Bacher, Brooks Gump, Shashi Kanbur, Paul Tomascak,  
Nicole L. Snyder, Cristina C. Clement, Carolina Ilie, Karen  
Sime, Emily Oaks, Venera Jouraeva, Tim Bran, Eric Helquist

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SUNY-Oswego Chapter of Sigma Xi, the Provost Office of SUNY-Oswego

## **ABSTRACTS:**

### **Graduate**

1)

2)

#### **Phylogeography of a Neotropical Migrant Isolated on Mountain “Islands”**

Joel Ralston<sup>1,2</sup> and Jeremy Kirchman<sup>1,2</sup>

<sup>1</sup>Department of Biological Sciences, University of Albany and <sup>2</sup>New York State Museum, Albany, NY  
Studying geographic structure of genetic diversity within species can lead to inferences about the history of populations, as well as the processes that lead to speciation. Geographically isolated populations offer an interesting opportunity for the application of phylogeography, as islands, both oceanic and ecological, are natural laboratories of evolution. Despite a mature body of theory and comparative data on the genetics of island birds, few studies have investigated geographic structure of avian populations isolated on mountains, and no study has compared structure among species that breed on mountains in the northeastern United States and Canada. Furthermore, human induced climate warming is causing habitat shifts and species range contractions, placing populations isolated on mountaintops at risk of extirpation. In the face of this threat to biodiversity, it is important to determine genetic structure of vulnerable species, and to determine whether isolated populations represent Evolutionarily Significant Units. Here, we present the phylogeography of Blackpoll Warbler (*Dendroica striata*), a Neotropical migrant with geographically disjunct breeding populations in the North East, based on a 355 bp fragment of Domain I of the mitochondrial control region from a subset of 175 samples collected from throughout the species range. We discuss whether gaps in the breeding distribution represent significant barriers to dispersal and gene flow, and the implications for our understanding of evolutionary processes and for the conservation of North American migrants isolated on mountains.

3)

#### **A Long-Term Assessment of Vegetation Change in the Adirondack Alpine Zone**

Sean Robinson

Department of Biological Sciences, SUNY Albany, Albany, NY

The Adirondack Mountains of New York State hold some of the southernmost communities of alpine vegetation in the eastern United States. Containing the greatest concentration of rare and endangered species found in New York State, this ~12,000-year-old ecosystem is important to the ecological history and biodiversity of northeastern North America. In order to determine floristic diversity and document vegetational shifts over time, a 300-ft-permanent transect was established on the summit of Mt. Marcy in 1957. In 1984, an additional 11 permanent transects were established on four summits of the MacIntyre Range (Wright, Algonquin, Boundary, and Iroquois) in the High Peaks region of the Adirondack Mountains. Using the line-intercept method, the Marcy transect was sampled in 1957, 1981, and 2007. Using the point-intercept method, the MacIntyre transects were sampled in 1984, 1994, 2002, and 2007. Results revealed that vegetation composition changed significantly over the 51-year and 23-year periods, with an overall decrease in bryophytes/lichens and an increase in vascular plants, indicating that vascular plants are replacing bryophytes in areas lacking anthropogenic disturbance. These results conform to predicted successional change and may also indicate compositional shifts in line with anticipated effects of global warming and atmospheric deposition on alpine plant communities.

4)

#### **Development of assays monitoring the inhibition of heat shock protein 70**

Cristina C. Clement<sup>1</sup> and Ryan D. Lang<sup>2</sup>

<sup>1</sup>Pathology, Albert Einstein College of Medicine, Bronx, NY, <sup>2</sup>Department of Chemistry, Oakwood University, Huntsville, AL

Heat shock proteins are molecular chaperones that are expressed both in response to cellular stress and in regular cellular functions. Heat shock protein 70 (Hsp70), one of the most common heat shock proteins, assists in the folding of other proteins and the hydrolysis of ATP. Hsp70 has also been identified as an inhibitor of caspase-3/7, which stimulate the induction of apoptosis. The elevated synthesis of Hsp70 has been found to contribute to tumorigenesis, and inhibition of Hsp70 in cancerous cells has been proven to induce apoptosis. In this study, various cell-based and biochemical assays were developed in order to assess the efficacy of Hsp70 inhibition in the treatment of cancer. Also, comparisons are made among potential Hsp70 inhibitors to assess which inhibitors are most effective. Sulforhodamine B, production of ATP-based assays and detection of caspase-3/7 activity were used to monitor inhibition of cancer cell growth in breast cancer (MDA-MB-468, MDA-MB-231, MCF-7, SK-BR-3) and small cell lung carcinoma (SCLC) (NCI-N417) cell lines upon treatment with different small organic molecules. ATP-ase assays were developed to monitor the inhibition of Hsp70 ATPase activity while a fluorescence polarization assay was developed to determine the direct interaction between human recombinant Hsp-70 and different potential inhibitors. Our results strongly support Hsp-70 as a potential target in anticancer research.

5)

6)

### **Detection of GHB Using Succinic Reductase Coupled with Diaphorase**

Andrew Banyikwa and Kestas Bendinskas

Chemistry Department, SUNY Oswego, Oswego, NY

The purpose of this project is to develop an effective, easy to use, and reliable biochemical assay that can detect gamma-hydroxybutyric acid (GHB) in alcoholic beverages. In this assay, succinic semialdehyde reductase (SSR) and diaphorase are coupled together. SSR oxidizes GHB and uses  $\text{NADP}^+$  as both proton and electron acceptor. Second enzyme diaphorase reduces DCIP (blue, max abs = 600 nm) to DCIP (colorless) and uses NADPH produced by SSR. DCIP is bleached only if GHB is present in the drink and remains blue if GHB is absent. Drinks tested in this assay are three beers: Labatt Classic (pale color), Labatt Red Amber (clear deep amber color), and Labatt Porter (dark reddish brown). GHB was successfully detected in strong drinks using SSR-phenazine methosulfate- DCIP reaction.

7)

### **Yawning and ambient temperature manipulation in budgerigars (*Melopsittacus undulatus*)**

Andrew C. Gallup, Michael L. Miller, and Anne B. Clark

Department of Biological Sciences, Binghamton University, Binghamton, New York 13902

Yawning is characterized by a large gaping of the mouth, with a deep inhalation, following by a shorter expiration. The spontaneous and involuntary nature of a yawn lend support for it having adaptive significance, yet there is little current consensus on its biological function. Our recent research suggests the yawning may serve a thermoregulatory function in endotherms, as budgerigars (*Melopsittacus undulatus*) yawn significantly more often during rising as opposed to constant ambient temperature. These results raise the question as to whether yawning is stimulated by temperature change itself. This study assessed the effects of both direction and range of temperature change on yawning in budgerigars. Using a repeated measures design, budgerigars were exposed to four, 10-minute temperature-changing conditions: (i) low-increasing (23-27°C), (ii) high-increasing (27-33°C), (iii) high-decreasing (34-28°C), and (iv) low-decreasing (28-24°C). Yawning, stretching, and other thermoregulatory behaviors (e.g., wing venting and gular fluttering) were related to ambient temperature and thermal condition. Results show that birds yawned at least twice as much during the high-phase of the increasing temperature condition (27-33°C), as compared to the other 3 phases. Yawning was positively correlated with ambient temperature, and also with gular fluttering and wing venting. These findings demonstrate that yawning is not stimulated simply by changing temperatures but probably functions as a cooling mechanism in budgerigars.

8)

### **Heterogeneous Ice Nucleation of Aqueous Seawater Aerosol Particles with Phytoplankton Acting as a Pre-Existing Substrate**

P. A. Alpert and D. A. Knopf

School of Marine and Atmospheric Sciences, SUNY Stony Brook, Stony Brook, NY

Atmospheric aerosol particles can affect the global radiation budget by directly scattering and absorbing solar and terrestrial radiation and indirectly by acting as cloud condensation nuclei and ice nuclei (IN) and thus modifying the radiative properties of clouds. We present a laboratory study on the efficiency of biogenic marine aerosol to act as IN in the atmosphere. The oceans are one of the most abundant sources of atmospheric aerosol composed of hygroscopic salts and other possibly hydrophilic biogenic material, i. e. photosynthetic phytoplankton with diameters about 2  $\mu\text{m}$ . Marine aerosol were detected at altitudes above 6 km and in polar regions where temperatures promote the formation of ice. Ice particles can form homogeneously from supercooled liquid particles or heterogeneously by various modes such as immersion, deposition, and contact nucleation. Here we investigate the efficiency of phytoplankton to act as pre-existing substrates in aqueous seawater aerosol particles to nucleate ice. The focus is on immersion mode freezing. Ice formation in micrometer-sized aerosol particles is observed using optical microscopy. Aqueous sea salt particles freeze homogeneously according to a recently proposed water activity based nucleation theory. We find that heterogeneous immersion mode freezing occurs at higher temperatures due to phytoplankton acting as ice nuclei, when compared with homogeneous freezing of aqueous sea salt aerosol. This study indicates that marine biogenic sources may have a potential impact on cloud formation and thus on climate.

9)

### **Homogeneous Ice Nucleation from Aqueous Particles Containing Constituents of Biomass Burning Aerosols**

Y. Rigg, D.A Knopf, and M.D. Lopez

School of Marine and Atmospheric Science, SUNY Stony Brook, Stony Brook, NY

Aerosol particles affect the global radiative budget by absorbing and scattering solar and terrestrial radiation. In addition, aerosol particles can also alter the radiative properties of existing and newly formed clouds by acting as ice nuclei (IN) and cloud condensation nuclei. The impact of these aerosol effects on the global radiative budget, and hence on climate, is highly uncertain. In particular the formation of ice in the atmosphere represents one of the largest unknowns. During biomass burning events, such as forest fires, large amounts of organic particles are emitted and have been shown to reach the upper troposphere and lower stratosphere (UT/LS) where temperatures facilitate the freezing of ice. The formation of ice clouds from supercooled aqueous aerosol particles can occur by homogeneous nucleation. In the laboratory, we generate micrometer-sized particles and mimic their composition according to typical organic compositions of biomass burning aerosol consisting of ammonium sulfate and levoglucosan but also more complex mixtures consisting of levoglucosan, galactosan, mannosan, syringic acid, vanillin, and 4-hydroxybenzoic acid. The particles are exposed in a homemade flow cell to conditions as present in the UT/LS such as relative humidity and temperature. The homogeneous freezing of ice and the corresponding melting point of the particles is observed and digitally recorded using optical microscopy. The melting and freezing data are analyzed with respect to water activity and compared to predictions of a recently proposed water activity based ice nucleation model.

10)

### **Indispensable Role of IL-6–Activated STAT3 in Promoting ICAM-1-Dependent Lymphocyte Trafficking During Fever-Range Thermal Stress**

Trupti Vardam<sup>\*1</sup>, Qing Chen<sup>1</sup>, Wan-Chao Wang<sup>1</sup>, Stefan Rose-John<sup>2</sup>, Matthias Ernst<sup>3</sup>, Heinz Baumann<sup>1</sup>, and Sharon S. Evans<sup>1</sup>

<sup>1</sup>Roswell Park Cancer Institute, Buffalo, NY, <sup>2</sup>Universitat Keil Medical School, Germany, and <sup>3</sup>Ludwig Institute for Cancer Research, Melbourne, Australia

Fever confers a survival benefit in vertebrate species although the underlying mechanisms are poorly understood. We have identified a novel lymphocyte–endothelial–interleukin-6 (IL-6) axis that enhances immune surveillance during thermal stress by promoting lymphocyte trafficking across specialized high endothelial venules (HEVs) of secondary lymphoid organs. During thermal stress, IL-6 upregulates expression of intercellular adhesion molecule-1 (ICAM-1) which supports firm arrest of lymphocytes on vessel walls and subsequent transendothelial migration. Here we examined the role of IL-6 downstream signaling pathways (STAT3/1, ERK1-2) in thermal induction of vascular ICAM-1. Comparative analysis of transgenic *gp130<sup>Y757F</sup>* mice and *gp130<sup>ΔSTAT3</sup>* mice deficient in IL-6–dependent activation of ERK and STAT3/1, respectively, initially implicated STAT3/1 in thermal induction of ICAM-1–dependent lymphocyte trafficking. Pharmacological inhibition using U0126 confirmed that MEK-ERK signaling is not required. Further, evidence that ICAM-1 is induced normally by thermal stress in *Stat1<sup>-/-</sup>* mice demonstrates that STAT3, not STAT1, is the key mediator. These studies provide insights into the signal transduction pathways that promote lymphocyte homing during acute inflammation. Additionally, these studies may provide novel strategies to either dampen immunity in autoimmune diseases or enhance immune response in cancer immunotherapy.

11)

### **Assessment of native riparian plant communities to improve agricultural buffer plantings**

Matthew Soranno<sup>1</sup>, Jillian Post<sup>2</sup>, Christopher T. Martine<sup>1</sup>, and Kenneth Adams<sup>2</sup>

<sup>1</sup>Department of Biological Sciences, <sup>2</sup>Center for Earth and Environmental Science, SUNY Plattsburgh, Plattsburgh, NY

The Little Chazy River is a 45-km long watercourse in the Lake Champlain basin with headwaters in the eastern foothills of the Adirondack Mountains. Land use along the river varies from minimally-managed and largely undisturbed conservation holdings to high-intensity agriculture. This latter use has inspired ongoing long-term research by faculty at SUNY Plattsburgh on nutrient loading and hydrology in the watershed, which in itself has led to a call for improvements in riparian buffer plantings. As a means to define the appropriate native species for buffer plantings, community sampling and surveys were conducted in 20 riparian habitats spanning the length of the river. Diversity and abundance of herbaceous plants, shrubs, and trees were determined in the riparian areas using sample lines/transects with a nested plot design. Multivariate ordination found that riparian plant communities mirror shifts in geology, soils, and elevation; and that core elements of these communities can be defined as functional species groups for specific reaches of the river. These core species groups will now be used to inform buffer planting recommendations made to owners of agricultural lands bordering the river.

12)

13)

14)

### Proteomic study of lead and mercury exposure in children

Robert E. Birdsall<sup>1</sup>, Jim MacKenzie<sup>2</sup>, Brooks Gump<sup>3</sup>, Kestas Bendinskas<sup>1</sup>

<sup>1</sup>Department of Chemistry, <sup>2</sup>Department of Biological Sciences, <sup>3</sup>Department of Psychology, SUNY Oswego, Oswego, NY

Heavy metal exposure (e.g., lead) in children has been linked with a variety of physiological and neurological problems including reduced IQ, learning disabilities, stunted growth, impaired hearing, cardiovascular problems, kidney damage, and liver damage. The goal of this research is to further the understanding of the biochemical mechanism and/or protein interactions responsible for the health problems related to lead (Pb) and mercury (Hg) exposure, specifically cardiovascular reactivity. Protease Inhibitor Cocktail treated plasma from thirty-four patients was used for our proteomic study. The samples were depleted of their twelve most abundant proteins using an antibody based affinity column, followed by analysis using 2D-PAGE and MALDI-TOF. Eleven unique proteins were identified as being significantly up-regulated or down-regulated due to Pb or Hg exposure. Apolipoprotein E, complement factor H-related protein 2, clusterin, vitronectin, gelsolin, human complement component C3c, and peptidoglycan recognition protein 2, were identified as candidate biomarkers for mediation between lead and cardiovascular reactivity in children.

### Undergraduate

15)

### Detection of a date rape drug: $\gamma$ -hydroxybutyric acid

Paul MacMahon<sup>1</sup>, Jim MacKenzie<sup>2</sup>, Kestas Bendinskas<sup>1</sup>

<sup>1</sup>Department of Chemistry, <sup>2</sup>Department of Biological Sciences, SUNY Oswego, Oswego, NY

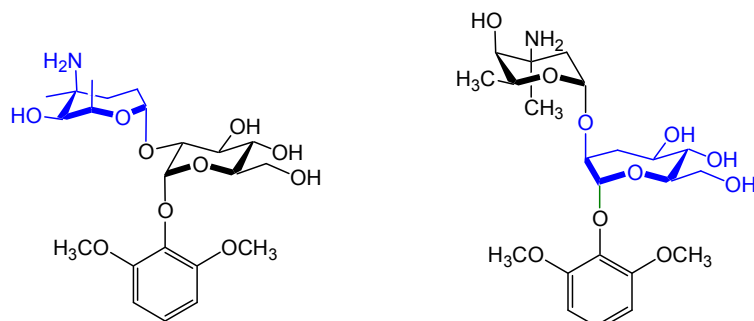
An Enzyme-Linked Immunosorbent Assay (ELISA) has been proposed as a possible rapid and reliable analytical biochemical method for detecting exogenous levels of  $\gamma$ -hydroxybutyric acid, GHB, in human blood and urine. Current project perspectives have been towards characterizing the specificity of the polyclonal primary antibody towards a GHB analog – 3-amino-4-hydroxybutanoic acid (GOBAB) in addition to eliciting the cause of the difficulties experienced in signal consistency. Recent findings have indicated that the two issues, inconsistency and questionable antibody specificity, may be related. Current investigations are focused on characterizing this possible relationship. The effects of varied salt concentrations on antibody binding are currently under investigation. Additionally attempts are being made to quantify the degree of antibody binding to both GOBAB and GHB.

16)

### Understanding the role of the vancomycin glycan in binding glycosyltransferases: The design and synthesis of two novel glycan derivatives of vancomycin with the potential for combating antibiotic resistance

Katherine A. Alser, Gail M. Corneau, Jared A. Pienkos, Lydia J. Rono, Ryan H. Seewald, Nicole L. Snyder, Department of Chemistry, Hamilton College, Clinton, NY

Vancomycin is a glycopeptide antibiotic used in the clinical setting for the treatment of methicillin-resistant *Staphylococci* and *Enterococci*. Vancomycin is composed of two bioactive components, a cyclic peptide component (aglycon) and a functionalized peripheral carbohydrate (glycan), that work together to inhibit the biosynthesis of peptidoglycan, a major component of the cell wall of gram-positive bacteria. Over the past twenty years, several vancomycin-resistant strains of bacteria have been detected. This has led researchers to search for new and more potent derivatives of vancomycin. Recent attempts aimed at reversing vancomycin resistance have focused on modifying the glycan component of vancomycin. The glycan is believed to play an important role in inhibiting bacterial cell wall biosynthesis by binding directly to the glycosyltransferases that convert peptidoglycan precursors into mature peptidoglycan, although the exact nature of this event is not well understood. Here we present the design and development of two novel glycan derivatives of vancomycin that incorporate a combination of natural and unnatural carbohydrates. The proposed derivatives will be evaluated for biological activity against penicillin binding protein 2 (PBP2) and the results obtained will be used to design more potent derivatives of vancomycin that can be used to combat resistant strains of gram-positive bacteria.



17)

### **Synthesis of Pterocillin Analogs**

Andrew Camelio, Yufang Liu, Caitlin Snyder, and Fehmi Damkaci, Department of Chemistry  
SUNY-Oswego, Oswego, NY

Pterocellin A and B are natural compounds that were extracted from marine-life off of the coast of New Zealand. Both natural products were discovered to have highly potent anticancer activity against leukemia, breast, lung, and melanoma cancer cells, but remain inactive *in vivo*. A convergent synthetic scheme has been strategically developed to potentially produce the analogous Pterocellin compounds with potentially more potent anticancer activity and increased *in vivo*/ reactivity. IN addition, we successfully synthesized four new analogs of Pterocellins using our new synthetic strategy, which one of them will let us modify even further to generate new analogs.

18)

### **Microwave assisted Regio-selective Friedel-crafts Acylation**

Megan Wagner, Greg Blette, and Fehmi Damkaci, Department of Chemistry  
SUNY-Oswego, Oswego, NY

Microwave-assisted organic synthesis (MAOS) has become a widely utilized technology in the recent past due to several advantages over conventional laboratory heating techniques. The enhancement of yields and reduction of reaction time have earned this methodology significance in the pharmaceutical and chemical industry. Currently, there are very few institutions using this technology for educational purposes, quite possible due to the lack of teaching laboratory procedures available. Therefore, it has become the aim of this project to develop an adequate laboratory procedure that will enable students to gain knowledge of microwave technology, as well as complete reactions that would otherwise be impractical in a laboratory setting, as they require extended periods of time and produce insufficient yields using conventional methods. Presently, a microwave-assisted Friedel-Crafts acylation reaction, in which toluene and acetic anhydride is reacted to yield 4-methylacetophenone, is being investigated as a possible teaching laboratory experiment.

19)

### **Glycosidation of Ribose and Deoxyribose: Is Stability or Flexibility more important in RNA and DNA?**

Fengrong Wang, Kestas Bendinskas, and Martha Bruch  
Chemistry Department, SUNY Oswego, Oswego

DNA, a long-term storage informational molecule, uses furanose and not pyranose ring for deoxyribose, the sugar component of its structure. Our earlier experiments with the methylation of ribose, a structural component of RNA, showed that pyranose rings are the thermodynamic products of that reaction. We hypothesized that the relatively short-lived RNA can afford to have an unstable five member ring in its structure but the derivitized deoxyribose is likely to be more stable in its furanose form, since the evolution must have selected a more stable ring for its long-term storage informational molecule. We methylated deoxyribose using a solid acid catalyst at two different conditions. The results show that methyl deoxyribofuranose is the kinetic product of the reaction and methyl deoxyribopyranose is the thermodynamic one. The loss of the hydroxyl at 2' did not make furanose ring more stable than pyranose ring. With our original hypothesis overturned, it seems reasonable to conclude that nature chooses a less stable form of the ring for the sake of flexibility of the structure.

20)

### **One-Photon Photophysical Properties of a meso-substituted porphyrin**

Khoa Ngo and Fotis Nifiatis

Chemistry Department, Plattsburgh State University, Plattsburgh, NY

Porphyrins and metalloporphyrin have drawn a lot of attention over the last decades due to their remarkably diverse photo- and electro-chemical properties. Their applications in multiple fields including biology, biomedicine, and chemistry and material science, makes their synthesis and characterization very important. Within we report the synthesis and characterization of 5,10,15,20(4'-*tert*-butylphenyl) free base porphyrin. One-photon photophysical studies show increased Stokes shift with solvent polarity, making the porphyrin a possible material for fluorescence polarity probes.

21)

### **Heavy Atom Effect: The Photophysical Properties of Halogenated Porphyrins**

Yashuda Gurunga and Fotis Nifiatis

Chemistry Department, Plattsburgh State University, Plattsburgh, NY

The photophysical properties halogenated porphyrins have been investigated using luminescence techniques. The fluorescence quantum yields of the halogenated porphyrin derivatives were found to be remarkably reduced in the order H, F, Cl, Br, I, especially for the heaviest iodine atom. These facts provide the evidence for increased intersystem crossing at the presence of a heavy atom.

22)

### **Hydrolysis rates of lignins**

John Spear and Dexter Criss

Department of Chemistry, SUNY Plattsburgh, Plattsburgh, NY

Previous experiments of  $\alpha$ -0-4 lignin model compounds suggest a more efficient rate of hydrolysis of native lignin. Preliminary syntheses and verification of these lignin model compounds was the central focus of this research and experiments performed. All synthesized compounds were controls that mimicked native lignin as found in nature. The reason for using controls was to develop the techniques necessary for the completion of the appropriate lignin models. The target  $\alpha$ -0-4 compounds have yet to be synthesized; however several steps toward their total synthesis were completed. Using these controls to develop the target compounds, further studies or experimentation can be conducted and centered on  $\alpha$ -0-4 lignin model compounds. Previous investigations of lignin model dimers determined that the bulk rate limiting step is cleavage of the  $\beta$ -0-4 linkage. Although, it has been suggested that the hydrolysis of  $\alpha$ -0-4 is faster than  $\beta$ -0-4, little work has been done to substantiate that claim. With the fundamental discovery that certain  $\beta$ -0-4 model compounds rearrange to  $\alpha$ -0-4 under experimental conditions, this study hopes to compare hydrolysis rates of  $\beta$ -0-4 to  $\alpha$ -0-4' analogs directly.

23)

### **Preliminary Studies of Redox Behavior of Mercapto-carboxylic Acids on Gold Electrodes in Basic Media**

Mai Than and Ewa Pater

Chemistry Department, SUNY Plattsburgh, Plattsburgh, NY

The behavior of self-assembled monolayers (SAMs) on metal substrates has been extensively characterized from the point of view of various applications of SAMs, e.g., as sensing and recognizing layers, substrates for cell cultures or as materials used in nanoscale fabrication of electronics. Among numerous SAMs systems, alkane-thiolates self-assembled on gold surface are probably the most extensively studied since these compounds possess sulfur-containing head groups with strong affinity towards gold substrates. Thus alkane-thiolates are common starting materials for creating chemically modified multilayer films. On the other hand, information related to the initial adsorption process of SAMs is very limited.

We investigate the electrochemical behavior of a series of mercapto-carboxylic acids with varying number of methyl groups in their alkane chains (mercaptoacetic, mercaptopropionic and mercaptoundecanoic acids) in 0.5M KOH solution, on gold electrodes. The focus of the study is the seemingly irreversible anodic process involving the acid and gold and occurring at much higher positive potential (e.g., +0.35V vs. SCE for mercapto-acetic acid in 0.5M KOH) than the potential of electrochemically induced adsorption/desorption described in the literature (typically around -0.70 V for the same system). Cyclic voltammetry (CV) and electrochemical quartz crystal microbalance (EQCM) are the main techniques employed to study the chosen systems.

24)

### **Gold Rotating Disk Electrode Voltammetry as a Tool to Study the Mechanism of Deposition of Self-Assembled Monolayers of Mercaptoacetic Acid**

Amanda Aldous and Ewa Pater

Chemistry Department, SUNY Plattsburgh, Plattsburgh, NY

Self-assembled monolayer (SAM) of mercaptoacetic acid (MAA) forms on gold (Au) surface as a result of reaction between Au and MAA. SAMs of various compounds have potential use in many analytical applications (e.g., as sensors, in analysis of vitamins and protein binding/ recognition) as well as in corrosion prevention. Most studies described in the literature deal with the characterization of already formed films and prospective applications of SAMs. In contrast, our investigation focuses primarily on the deposition process itself.

Two techniques used in the study were cyclic voltammetry (CV) and open circuit potentiometry (OCP). Rotating disk electrode (RDE) was used as a working electrode while carbon rod and saturated calomel electrode (SCE) served as the counter and reference electrodes, respectively. Experiments were carried out in a 0.5M KOH solution containing various amounts of MAA.

CV experiments were used to determine the relationship between the anodic peak current, corresponding to the oxidation of MAA vs. concentration of MAA and rotation speed ( $\omega$ ) of Au-RDE. The results were analyzed by applying Levich equation. In the OCP experiments, we measured the reaction time between MAA in the solution and oxidized gold surface as a function of  $\omega$  and MAA concentration. Reaction time decreases exponentially (from 300s to and 35s) with increased concentration of MAA (from 0.072 mM to 7.2 mM) but it is not affected by  $\omega$ . The rationalization of the results as they apply to the mechanism of adsorption will be presented.

25)

### **Attempts to decipher whether there is a counterion effect on the redox properties of bridged monovacant heteropolytungstates**

Kirby, James F., Proffitt, Andrew R., and Bartholomew, Joel

Quinnipiac University, Hamden, CT

The effects of group I metals ( $\text{Li}^+$ ,  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Rb}^+$ , and  $\text{Cs}^+$ ) as counter-ions to the thorium(IV) bridged bis(heptadecatungstate) anion were previously analyzed by cyclic voltammetry in pH 4.7 lithium acetate/acetic acid buffer. The presented results showed a shift in the reoxidation potentials towards zero as the counter-ions increase in size. The follow up studies using group I cations ( $\text{Li}^+$ ,  $\text{Na}^+$ ,  $\text{K}^+$  and  $\text{Rb}^+$ ) with the lanthanum(III) and cerium(IV) bridged bis(heptadecatungstate) anions did not demonstrate a similar phenomenon. The results and possible explanations for the lack of reoccurring phenomenon will be presented.

26)

27)

### **Scientific thinking in collaborative settings**

Christie Hillenbrand<sup>1</sup>, Leigh Bacher<sup>1</sup>, Brad Wray<sup>2</sup>, and Katie Crandall<sup>1</sup>

<sup>1</sup>Psychology Department and <sup>2</sup>Department Philosophy, SUNY Oswego, Oswego, NY

We are investigating the scientific thinking abilities of college students when students work individually and in partnerships. Specifically, we are looking at the ability to use alternative explanations, evaluate and interpret evidence and to identify assumptions. Currently, a total of 28 students have participated. During the sessions, groups of eight or fewer students completed two sets of problems individually as well as in pairs. The sessions were held in quiet office spaces, and the order of the conditions (solo or pair) was counterbalanced. The partnerships were performed both with friends and non-friends. One hypothesis was that individuals will answer more items correctly when working with a partner than when working alone. Results showed a trend for higher scores when working with a partner compared to working alone. Interestingly, students who believed that working in pairs had improved their scores on the problems did not score differently than students who believed that working in pairs would not improve their scores. Future analysis may be able to tell us whether knowing the partner previously will have an effect on their score. We will also test for effects of research experience and coursework.

28)

### **Values Affirmation and Emotional Engagement with the 2008 Presidential Election**

Madeline Lormand<sup>1</sup>, Karine Russell<sup>1</sup>, Elizabeth June<sup>1</sup>, Shamika Jackson<sup>1</sup>, Stephanie Swan<sup>1</sup>, Ellen Gagné<sup>1</sup>, Kathryn Childs<sup>1</sup>, Gregory Spirer<sup>1</sup>, and Leigh Ann Vaughn<sup>1</sup>

<sup>1</sup>Department of Psychology, Ithaca College, Ithaca, NY

Over 20 years of research in social psychology has shown that affirming a personally important value can reduce defensiveness, and recent research suggests that this may occur because affirming a personally important value reminds people what they care about beyond themselves (Crocker, Niiya, & Mischkowski, 2008). Connected, other-focused emotions like love appear to account for this effect. We predicted that if affirming a personally important value helps people transcend themselves (perhaps through enhancing love) it should do more than decrease defensiveness; it could enhance emotional engagement with the 2008 presidential election. To test this hypothesis in the week before the election, we asked 32 college student participants to rank-order five values in order of personal importance; those randomly assigned to the high (low)-affirmation condition then wrote about why their top (lowest)-ranked value was (could be) important and meaningful to them (to someone else). Then they reported how much of a variety of emotions they experienced as they wrote and, in a separate section of the questionnaire, forecasted how happy they would feel 1, 2, and 3 days after the election if their preferred candidate or the other candidate won. Participants in the high-affirmation condition reported more positive emotions (including love) and forecasted feeling happier if their preferred candidate won and less happy if the other candidate won. Love was the only feeling that statistically accounted for this effect. These results suggest that values affirmation may help people emotionally engage with events in the world that are beyond their everyday concerns.

29)

### **Predictors of Subjective Social Status at School among College Students**

Kathryn Childs<sup>1</sup>, Stephanie Swan<sup>1</sup>, Ellen Gagné<sup>1</sup>, Gregory Spirer<sup>1</sup>, Karine Russell<sup>1</sup>, Madeline Lormand<sup>1</sup>, Elizabeth June<sup>1</sup>, , R<sup>1</sup>, Shamika Jackson<sup>1</sup>, and Leigh Ann Vaughn<sup>1</sup>

<sup>1</sup>Department of Psychology, Ithaca College, Ithaca, NY

Subjective social status (SSS) has received increasing attention from researchers as a predictor of many important physical and psychological health outcomes; this is because SSS is often a better predictor than more objective measures of social status. In spite of its importance, little research has examined the predictors of SSS, and the existing research has focused

on subjective social status among middle-aged adults. We predicted that SSS at school among college students may relate to their families' SSS and to favorable personality traits like Extraversion. Additionally, however, we expected that more powerful predictors of SSS at college would include students' subjective assessments of how well they had done at attaining personal accomplishments (promotion pride) and of how well they had done at fulfilling their duties and obligations (prevention pride). When simultaneously using these four predictors plus the traits of Agreeableness, Conscientiousness, Openness, and Neuroticism, as well as objective measures of social status (parental education and income), only promotion pride, prevention pride, Extraversion, and their families' SSS were significant predictors of SSS at college – promotion and prevention pride most strongly. This finding is consistent with research on middle-aged adults in documenting the important role of subjective past experience in predicting current SSS. Future research should examine whether these predictors account for health outcomes in college students, and whether predictors of SSS at college differ for students from working-class and middle-class backgrounds.

**30)**

### **Do blondes really have more fun? Predictions of behavior from women's photos**

Kim Jensen, Mindy Hoftender, and Rebecca L. Burch

Psychology Department, State University of New York at Oswego

Male and female undergraduates viewed pictures of women's bodies (with the faces obscured and were asked to make predictions about the women's personalities and behaviors. The behaviors were of a sexual nature, including infidelity, promiscuity, and treatment of romantic partners. The blonde women depicted in the photographs were rated as healthier, more likely to have children, and more helpful to others. Blondes were also (contrary to the jokes) rated as more intelligent. Brunettes were rated as lonelier, more cruel, sickly, and more selfish. Brunettes were rated higher on all the sexual behaviors and measures of promiscuity, including infidelity, having an STD, sleeping with strangers, and using sex to manipulate others.

**31)**

### **Comparison of intercourse inside and outside of the relationship**

Dara Sobowale and Rebecca L. Burch

Psychology Department, State University of New York at Oswego

Male and female undergraduates were instructed to complete several questions regarding their current sexual relationship, frequency of infidelity in that relationship, and how the intercourse differed between inrapair copulations and extrapair copulations. Roughly one third of both men and women reported cheating on their partner, with women reporting slightly more extrapair partners. Both males and females reported that intercourse lasted longer, was more arousing and more satisfying during an "affair" than when in a relationship. Women reported greater speed and ease of orgasm. Both sexes reported greater male effort during the EPC. Most respondents reported a fear of getting caught that might have increased their excitement.

**32)**

### **Modern American Circumcision**

Dan Ivancic and Becky Burch

Psychology Department, SUNY Oswego, Oswego, NY

The goal of this presentation is to combine historical, medical and psychological research on modern circumcision practices. The intent is to provide new insight and means for questioning the merit of this widely accepted cultural practice. The history is sourced at the earliest historical record and traced through diverging cultures as the practice is adopted and adapted for various rationales. The current medical justification as a preventive and cleanliness measure is examined on the basis of adequacy. Ethical consideration is provided in the context of the Hippocratic Oath and basic human rights. Information on possible psychological effects on self image and socio-sexual development are also considered. Various techniques of performing the surgery, including risks and possible complications, are presented as well as various restorative techniques.

**33)**

### **Do the clothes make the woman 1: showing skin**

Dan Sheldon, Kim Jensen, and Rebecca L. Burch

Psychology Department, State University of New York at Oswego

Male and female undergraduates viewed pictures of women's bodies (with the faces obscured and were asked to make predictions about the women's personalities and behaviors. The behaviors were of a sexual nature, including infidelity, promiscuity, and treatment of romantic partners. Women wearing clothing that was not low cut (exposing the upper torso and cleavage) were rated as being older, healthier, more likely to be married and to have children. They were also predicted to have lost their virginity at a later age. Women wearing low cut clothing were rated as having more attractive partners and being more promiscuous (having an STD, cheating, having sex with strangers, etc.).

34)

### **Do the clothes make the woman 2: color and fit**

Mindy Hoftender, Dan Sheldon, and Rebecca L. Burch

Psychology Department, State University of New York at Oswego

Male and female undergraduates viewed pictures of women's bodies (with the faces obscured and were asked to make predictions about the women's personalities and behaviors. The behaviors were of a sexual nature, including infidelity, promiscuity, and treatment of romantic partners. Women wearing tight fitting clothing were rated as healthier, friendlier, and more likely to be in a relationship. They were also more likely to be selfish and cheat on their partners. Women with loose fitting clothing were rated as older, having more children, and more likely to be homosexual. Stimuli were also split into those women wearing black clothing versus brightly colored clothing. Women wearing black were rated as younger, having more sexual partners, losing their virginity at an earlier age, and having sex more often. Women wearing black were also rated higher on various measures of promiscuity.

35)

36)

37)

### **Exploration of Alternatives to Oil in the Biotechnology Sector**

Andrew Cerone and Fotis Nifiatis

Chemistry Department, Plattsburgh State University

Peak oil is a fact. According to previous research performed by accredited geologists, mathematicians, biotechnologists, and economists, oils demise as the world's energy source is within our generation's foreseeable future and is futile. Two issues must be satisfied when considering a viable alternative to our economies fuel. Scientifically speaking, the new alternative, or combined alternatives, must both be "clean", free of environmentally toxic emissions that may intensify the greenhouse effect, as well as inextinguishable. Also, economically speaking, the new energy source needs to be cost effective. This study will explore both scientific and economic considerations associated to alternative energy.

Biotechnology companies attempting to contribute to alternative energies will be analyzed for their cost effectiveness, feasibility, and GGE/environmental impact.

38)

### **Electrostatic Lens Control of the Electrospray Onset**

Dennis Quill and Adrian Ieta

Department of Physics, State University of New York at Oswego, Oswego, NY

There are numerous applications of electrosprays, from deposition of ultra-thin films of inorganic, organic and biological materials to the generation of nanoparticles and nanofibers, nanoencapsulation of drugs, steering of microsatellites. The onset voltage parameter is of special interest in electrospray. In our study we explore the control of the onset voltage of aqueous electrosprays using electrostatic lenses. A set of two high voltage ring electrodes is used for confining the spray jets and controlling the onset voltage. The spray nanocurrents are recorded and analyzed using both positive and negative needle-plate polarities. The rings are powered separately using precision high voltage power supplies. The transitory regime is clearly marked by the current-voltage characteristics and the correlated dynamics of the spray are investigated for those regions using a MotionScope high speed camera. Our work provides valuable data for electrospray design and control, which may be used for industrial applications.

39)

### **Water and Air Temperature Analysis of Rice Creek Field Station**

Julio Mallonga and Ampalavanar Nanthakumar

Mathematics Department and Department of Biological Sciences, SUNY Oswego, Oswego, NY

Long term local water temperature and air temperature data contribute to our holistic understanding of an aquatic ecosystem. In this study we verify significant relationships between water/air temperatures. Three years of high frequency (30 minute) water temperature data obtained from in situ data loggers. Corresponding meteorology data obtained from Rice Creek Field Station weather station. Semi-monthly and monthly average data will be presented with discussion of lag times between water/air temperatures. Time series analysis was then used to analyze trends in water/air temperature. Furthermore, we explore the seasonal fluctuations of water temperature and their correlation over a three-year period at Rice Creek Field Station. From this study we learn that short-duration experiments may not allow for sufficient data for significant forecasts of temperature. Even though our data covered a three year time period, we were not able to see any long term evidence of global warming.

40)

### **Cubic Polynomial fits to M31 RR Lyrae light curves**

C. Morgan, S. Reyner, and S. Kanbur

Departments of Mathematics and Physics, SUNY Oswego, Oswego, NY

Variable stars, particularly RR Lyraes, play an important role in astrophysics: as age and distance scale indicators. Accurate observed light curves are essential in this regard. However, all such curves are subject to numerical noise and to instrumental artifacts. In order to quantitatively compare light curves, it is useful to have a compact mathematical summary of such curves which contains all essential physical features and excludes numerical noise. In this work, we develop a new method of summarizing the quantitative structure of RR Lyrae light curves in that we approximate observed RR Lyrae light curves using cubic polynomials. We compare existing Fourier techniques with this new method and summarize the advantages of the latter approach using a sample of RR Lyrae stars in the nearby galaxy M31.

41)

### **Photometry using secondary standards in the SUNY Oswego LMC IR Survey**

F. Ripple, S. Kanbur, C. Ngeow, L. Macri

Physics Department, SUNY Oswego, University of Illinois, Texas A&M University

Cepheids are vital objects astrophysically: their luminosity varies regularly with time and the mean luminosity over a pulsation cycle is related to the period of pulsation. This Period-Luminosity (PL) relation holds the key to an accurate size scale in the Universe. However recent work at optical wavelengths suggests this relation is non-linear. Here we review progress on attempts aimed at obtaining new Cepheid data in the LMC to look for nonlinearity in the infra-red. We review progress made on data reduction and photometric analysis of the large SUNY Oswego LMC IR Survey and show some sample Cepheid light curves and CMD diagrams obtained and describe briefly what these results may be applied to. We also describe the method of secondary standards which can be used to improve the quality of light curves obtained.

42)

### **Period Color Relations for RR Lyraes as a function of phase in the Sloan Digital Sky Survey**

Martin Berke, S. Kanbur, C. Ngeow

Physics Department, SUNY Oswego, University of Illinois

The Sloan Digital Sky Survey (SDSS) is a large survey of the entire sky with results becoming available almost instantly on the web. RR Lyrae stars are pulsating stars whose luminosity varies regularly with time with periods of the order of hours. Their mean absolute magnitude and its relation to metallicity holds the key to a population II distance scale and age estimates of the Universe. A number of RR Lyraes have been discovered by the SDSS. Period-Color relations at mean light have been extensively used to study important properties of RR Lyraes, in particular the fact that at mean light the PC relation is almost flat. Here we report on a study of PC relations as a function of phase for RR Lyrae stars discovered by the SDSS. We also comment briefly on a new method to apply "light curve templates" to this approach. This approach, can in principle permit the accurate reconstruction of an observed light curve even though the number of observed data points is quite small.

43)

### **Is the LMC Cepheid PL relation different to the SMC Cepheid PL relation**

Robin Dienhoffer, Stephanie Magin, Lillie Ghobrial, Frank Ripple, S. Kanbur

Physics Department, SUNY Oswego, Oswego, NY

The Cepheid Period-Luminosity (PL) relation is of fundamental importance in Astrophysics: a key assumption is that the slope is independent of metallicity. Here we compare the slope of the Cepheid PL relation in the LMC using OGLE III data with that in the SMC using OGLE II data using a t-test. Reddening is computed using existing maps. We find a significant difference and indeed the difference in slopes goes the wrong way compared to predictions from theoretical models.

44)

### **Multiphase PC/PL relations: comparison between theory and observations**

Stephanie Magin, J. Halsey, C. Bissel

Physics Department, SUNY Oswego, Oswego, NY

Cepheids are fundamental objects astrophysically. These stars pulsate with a regularly varying luminosity. There is a relationship between the mean luminosity and the period of a Cepheid and through this Period-Luminosity (PL) relation, Cepheids hold the key to a CMB independent estimate of Hubble's constant.

Hence it is of great interest to understand these objects. An entirely new way of comparing theory and observations is via Period-Color and Amplitude-Color relations as a function of phase. Here we present the first such comparison between

observations of LMC Cepheids and full amplitude radiation hydrodynamic models of such stars. We find important discrepancies between theory and observations in certain period ranges.

45)

### **Water Interaction with Polymers**

Wes Laurion and Carolina C Ilie

Physics Department, SUNY Oswego, Oswego, NY

We discuss herein the interaction of water with three different polymers: the ferroelectric copolymer polyvinylidene fluoride with trifluoroethylene P(VDF-TrFE), the dipole oriented polymer polymethyl vinylidene cyanide PMVC, and the photoresist polymer poly(methyl methacrylate) PMMA. The acrylate polymer PMMA is used in photolithography as the positive or negative masks. Our goal is to investigate if the water is adsorbed / absorbed on the photoresist, affecting the dimensions of the masks and therefore the quality of the device. Weight measurements and XRD theta – 2 theta may show if the film is swelling upon water absorption. Preliminary study of water absorption of photoresist polymer PMMA (poly(methyl methacrylate)) is also presented. The unoccupied electronic states are calculated by Hyperchem package and we compare the band gap of the film without water and in the presence of water. Previous studies of water absorption on P(VDF-TrFE) and PMVC proved that water adsorption leads to swelling and disorder within the (co)polymer chains and the water dipole interacts with the dipoles of the (co)polymers.

46)

### **Water Interaction with a Photoresist Polymer**

Kenneth Buske and Carolina C Ilie

Physics Department, SUNY Oswego, Oswego, NY

The comparison between water adsorption on photoresist and water absorption on ferroelectric copolymer polyvinylidene fluoride with trifluoroethylene P(VDF-TrFE) is discussed. Previous studies of water adsorption on the ferroelectric polymer P(VDF-TrFE) proved that water determines swelling and disorder within the copolymer chain, and the dipole of the water molecule interacts with the dipole of the ferroelectric copolymer.

Preliminary study of water absorption of photoresist polymer PMMA poly(methyl methacrylate) is presented. The theoretical calculations of the unoccupied electron states are done using Hyperchem package, parametric method 3 – neglecting differential overlap - PM3 NDO method.

PMMA polymer is used for aircraft glazing, but also for photolithography in nanotechnology. The influence of the water at the polymer/silica interface on the quality of the polymer film was studied before. Our goal is to analyze the water adsorption on the polymer surface and to discuss the influence of water on the photoresist.

47)

### **The Brain and Computational Modeling: Influence of Neuronal Morphology on its Repetitive Firing**

Harold L. Gomes<sup>1, 2</sup>, Nicholas T. Carnevale M.D., Ph.D.<sup>3</sup> and Joshua C. Brumberg Ph.D.<sup>4, 5</sup>

Departments of <sup>1</sup>Physics, <sup>2</sup>Mathematics and <sup>4</sup>Psychology, Queens College, CUNY

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<sup>5</sup>Neuropsychology PhD Subprogram, The Graduate Center, CUNY

The brain is a complex physiological system, where physical quantities such as, voltage, electricity, cell geometry play important roles in complex computations and information processing. Yet, the physics and mathematics underlying the detailed-mechanism are often mysterious. Neurons are the basic building blocks of our nervous system, and action potentials (voltage-impulses) are at the core of the information encoding-decoding process. Neurons can be classified based upon their physiological and geometrical features which have been shown to vary in biological experiments. These differences are thought to influence their computational abilities. Six morphological groups of neurons were identified in a different study. Here, we have investigated the role of cell geometry on repetitive firing of action potentials i.e., voltage-frequency. Using NEURON—a modeling software—we have simulated 146 actual neurons with Hodgkin-Huxley dynamics  $\sum I_m = C_m(dV_m/dt) + g_{Na}(V_m - E_{Na}) + g_K(V_m - E_K) + g_L(V_m - E_L)$  under six different computational models, to compare and contrast the electrophysiology among the morphological groups. We have injected electric current to find the corresponding voltage-frequency response of neurons. Geometric variables were the only parameters that varied in each cell (i.e., actual cell morphology). All other experimental variables were held constant in any specific model. Our results indicate that there were indeed differences and similarities in electrophysiology across the groups. Since all six models had similar results, the degree of validity of modeling technique is high. Thus, we believe that neuronal geometry can strongly influence action potential dynamics, and these biophysical differences may lead to a better understanding of the information processing in our complex nervous system.

48)

### **The Effect of Peroxiredoxins Overexpression in Cancerous Cells**

Bridget Walsh, Amanda Pearl, and Shelley Phelan

Department, Fairfield University, Fairfield, CT

Antioxidants are produced by cells to protect cellular structures from reactive oxygen species (ROS). Peroxiredoxins, a family of thiol-specific antioxidant proteins, are expressed in many mammalian tissues and reduce a range of cellular peroxides. It is widely reported that cancer cells exhibit higher levels of ROS, but are relatively resistant to their toxicity. Recently, some cancer types have been shown to express higher levels of peroxiredoxins than normal cells. Based on these observations, we hypothesized that the cancerous Hepa1-6 hepatocyte cell line would have increased peroxiredoxin expression and increased resistance to peroxide-toxicity as compared to the non-cancerous H2.35 hepatocyte line. We measured mRNA and protein levels of Prdx1 and Prdx6 using real-time PCR and western blotting. We found that hepa1-6 cells expressed three-fold higher levels of Prdx6 than H2.35 cells, while the levels of Prdx1 mRNA were relatively similar. After 24 hours of 0.5 mM hydrogen peroxide exposure, Hepa1-6 cells showed significantly lower toxicity than the H2.35 cells as measured by trypan blue exclusion and LDH activity. Exposure to hydrogen peroxide significantly upregulated the mRNA expression of Prdx6 in H2.35 cells, and both Prdx1 and Prdx6 in hepa1-6 cells. Transient transfection of a Prdx6 promoter-driven reporter construct into hepa1-6 cells led to higher levels of reporter expression than similar transfections of H2.35 cells. Our results demonstrate a correlation between Prdx6 expression and peroxide-resistance in this cancer line, and suggest that these cells may upregulate Prdx6 in response to the higher ROS environment, providing protection from cell death.

49)

### **The Role of Peroxiredoxin 6 in Cancer Cell Resistance to Peroxide-Induced Cell Death**

Sarah Suchy, Kristin Visco, John Tartaglio, and Shelley Phelan

Department, Fairfield University, Fairfield, CT

Reactive oxygen species (ROS) such as hydrogen peroxide are generated in cells by normal metabolism and in response to various agents and conditions. The accumulation of ROS to high levels can lead to the inactivation of macromolecules, and sometimes cell death. Peroxiredoxin 6 is a member of a protein family that detoxifies reactive oxygen species like hydrogen peroxide. Unpublished results from our lab have demonstrated that the cancerous Hepa1-6 hepatocyte cell line expresses higher levels of Prdx6 and lower peroxide-induced toxicity as compared to the non-cancerous H2.35 hepatocyte line. We hypothesize that the elevation of Peroxiredoxin 6 in Hepa1-6 cells protects them from peroxide-induced cell death. Using western blotting, we found that H2.35 cells normally express p53, and the level is not induced by hydrogen peroxide. In contrast, Hepa1-6 cells express no p53 before or after treatment. Based on a colorimetric caspase-3 assay for apoptosis, we showed that peroxide-induced cell death in H2.35 cells does not occur by apoptosis. Further analysis of cell morphology and ethidium bromide nuclear staining suggests that this peroxide-induced cell death occurs by necrosis. We next investigated whether suppression of Prdx6 expression in Hepa1-6 by siRNA would increase susceptibility to peroxide-induced toxicity. Our results show that Prdx6 is down-regulated in siRNA-transfected cells. We currently are examining whether this suppression of Prdx6 increases cell death in response to hydrogen peroxide. This work may provide new insight into the molecular changes associated with carcinogenesis.

50)

### **Genetic Diversity as a Contributing Factor to the Varying Population Sizes of the Chinook salmon and Lake trout of Lake Ontario**

Nadia E. Kralovic and Amy Welsh

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With the intentions of gaining a greater understanding of the population variations of Chinook salmon and lake trout of Lake Ontario, I plan to study the genetic diversity of the two species in order to determine if genetics is the underlying explanation for the fluctuations in population sizes between these two species in this area. In past years, both species have been stocked in Lake Ontario in attempt to restore their declining populations. Currently, both populations are dependent on the stocking for their survival. Out of the two species, the salmon is naturalized and the trout is historically native to Lake Ontario. Analyzing the genetic information of these two populations will provide an increased understanding of the patterns in these population fluctuations and will help inspire new strategies of restoring and maintaining these two populations.

51)

**Investigating tandem repeats in the androgen receptor gene in relation to the 2D:4D finger ratio hypothesis and aggressive behavior in males.**

Krista Morales, Samantha McCreary, and Nancy Elwess

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The objectives of this study are to investigate the relationship between the number of tandem repeats within the androgen receptor gene, finger ratios of the ring finger and index finger (2D:4D), and aggressive behavior in men. Data analyzed was collected from men's college sports teams and control participants. Previous research has indicated that the sensitivity to testosterone in humans is related to the number of CAG trinucleotide tandem repeats within the androgen receptor gene. These tandem repeats play a role in determining the ratio of the 2D:4D digits. The hypothesis of this research project seeks to show a correlation amongst CAG tandem repeats, 2D:4D ratios and aggression tendencies. Preliminary results were obtained by isolating the androgen receptor gene in the men's college lacrosse and cross-country teams using PCR reactions and gel electrophoresis analysis. In addition, this study will contribute to the knowledge of the existing 2D:4D ratio research.

52)

**Investigating the effects of anthropogenic disturbances on the stress response in a Central American songbird, the Clay-colored Thrush (*Turdus grayi*)**

Jonathan Haskins, Frank Spizzoucco, and Brian Walker

Department of Biology, Fairfield University, Fairfield, CT

We studied the physiological effects of anthropogenic disturbances on the clay colored thrush (*Turdus grayi*), by comparing the baseline and stress-induced corticosterone levels in two very different populations. We compared birds living in urban Managua, Nicaragua, to those living on a rural shade-grown coffee farm in the mountains of North Central Nicaragua. Birds were captured and serial blood samples were collected over the course of an hour to determine corticosterone levels in response to acute stress. Our results suggest that birds living in urban environments show a reduced stress response, likely due to a process of habituation to a highly disturbed habitat. In addition, we show that juvenile birds (urban only) show a higher stress response than adults, again suggesting that adults go through a process of habituation to stress. We further report differences between male and female stress responses, as well as examine the potential for morphological differences between these two populations.

53)

**A Baiting Technique to Reduce the Prevalence of Raccoon Roundworm in Allegheny Woodrat Habitat**

Daniel Bowden

Department of Biological Sciences, Union College, Schenectady, NY

The Allegheny woodrat (*Neotoma magister*) is a North American small mammal considered endangered, threatened, or of concern in all known states of occupancy. There is evidence that the parasite, raccoon roundworm (*Baylisascaris procyonis*), may be partly responsible for the decline of the species. In this study, I tested the effectiveness of a baiting technique to reduce the prevalence of *B. procyonis* in the Palisades Interstate Park, NJ, the last known population of the species in its northeastern range. Baits containing an anti-parasitic drug were distributed for consumption by raccoons (*Procyon lotor*). Raccoon roundworm contamination was measured throughout the fall egg shedding period and compared against historical data collected in NJ during the same months. Consistent with patterns previously observed, contamination increased in both the test site and the reference sites as the egg shedding period progressed. However, by late November the contamination had risen to 65% in the reference sites and only 33% in the test site. This study suggests that anti-parasitic baits can reduce contamination levels. This baiting technique should be considered as part of a management strategy to prevent further decline of the Allegheny woodrat.

54)

**The Effect of Environmental Conditions on Hemoglobin in *Paramecium tetraurelia***

Naoko Hashimoto

Department of Biological Science, SUNY Plattsburgh, Plattsburgh, NY

This laboratory has shown that *Paramecium tetraurelia* a unicellular eukaryote has a hemoglobin gene present in its genome. This investigation examines the level of expression of this gene under different environmental conditions. In addition, T-maze assay were performed to determine if environmental conditions influenced behavior.

55)

### **A Comparative Survey of Gall Insects and Mites of Sugar Maple (*Acer saccharum*) and Green Ash (*Fraxinus pennsylvanica*) in Forest and Urban Environments**

Wendy Paterson, Paul Voninski, and Karen Sime

Department of Biological Sciences, SUNY Oswego, Oswego NY

Insect- and mite-induced galls generally cause no harm to plants because their populations are normally small. Human changes to the environment are often associated with higher population densities of galling insects and consequently a higher incidence of damage to host plants. Both green ash (*Fraxinus pennsylvanica*) and sugar maples (*Acer saccharum*) and their galling insects and mites are found in both the urban setting of the city of Oswego, NY, and in the natural environment of Rice Creek Field station (RCFS). The population densities of gallmakers on these trees were compared by survey in both environments. Out of the ten galling species of ashes and maples found in both environments only two were found to be more abundant in town.

56)

### **Isolation and purification of metalloproteinase inhibitors from small mammal prey of venomous snakes**

Jenna Marcinczyk<sup>1</sup>, Sara Lander<sup>1</sup>, and James Biardi<sup>1,2</sup>

<sup>1</sup>Department of Biology and <sup>2</sup>Department of Chemistry, Fairfield University, Fairfield, CT

The purpose of this study was to isolate and purify the protein responsible in the California ground squirrel (*Spermophilus beecheyi*) for inhibiting snake venom metalloprotease (SVMP) activity. While current clinical treatment to snake bites relies on the use of antibodies harvested from inoculated domestic animals, our goal is to characterize innately expressed *S. beecheyi* SVMP inhibiting proteins as a novel alternative lead for snake venom therapy. A Bio-Rad BioLogic DuoFlow chromatography system was used in a three-phase purification strategy in order to isolate, concentrate and stabilize the target serum protein. The first phase is affinity chromatography on a HiTrap Blue column. This step has isolated serum protein fractions that demonstrate venom inhibition when assayed against venom of the sympatric northern pacific rattlesnake (*Crotalus viridis oreganus*). These fractions are further separated using anion exchange chromatography on a UNO Q1 column, followed by gel filtration chromatography to clean up fractions with SVMP inhibition. We are applying this protocol to check for SVMP inhibitors in plasma samples from other small mammals subject to snake predation. We hope to better evaluate the biochemical makeup of these proteins so that innate venom resistance in mammals can be better understood.

57)

### **Assessing genetic diversity of invasive Annual Wheatgrass, *Agropyron triticeum*, in Yellowstone National Park using AFLP analysis**

Kimberly Wahl<sup>1</sup>, C. Eric Hellquist<sup>1</sup>, E. William Hamilton<sup>2</sup>, Amy Welsh<sup>1</sup>

<sup>1</sup>Department of Biological Sciences, SUNY Oswego, Oswego NY

<sup>2</sup>Department of Biology, Washington and Lee University, Lexington, VA

Exotic species invasions have repeatedly contributed to changes in ecosystem function worldwide. The introduction of exotic species may produce changes in resource availability, community composition and major ecosystem processes. These impacts may be especially detrimental to local environments, and can have long-term ecological effects. Invasive plant species are especially problematic in the arid grasslands of the Gardiner Basin in Yellowstone National Park, which is extensively colonized by *Agropyron triticeum* (Annual Wheatgrass) and *Alyssum desertorum* (Desert Alyssum). These species have altered community structure in Gardiner Basin and are targeted for removal via a Yellowstone National Park grassland restoration project. We are analyzing three populations of annual wheatgrass from the Gardiner Basin using amplified fragment-length polymorphisms (AFLPs) to identify possible patterns in genetic diversity that may contribute to the success of this invasive species. Although successful adaptations of invasive species were originally attributed to an elevated level of genetic diversity, recent studies suggest the level of diversity varies between invasive species. Low genetic diversity due to population bottlenecks may occur in one population or species of invaders, while elevated genetic diversity as a result of heterozygosity or repeated species introductions may develop in another. The specificity of AFLP analysis coupled with its versatility will provide the necessary tool for determining the underlying genetic structure of the invasive annual wheatgrass populations in Yellowstone National Park.

58)

### **Protein Subcellular Relocalization as a Method of Duplicate Gene Retention and Functional Diversification**

Ryan Duggan<sup>1</sup> and Brian Carroll<sup>1</sup>

<sup>1</sup>Department of Biological Sciences, Fairfield University, Fairfield, CT

A recently proposed mechanism describing the evolution of new genes and new gene functions following duplication is Protein Subcellular Relocalization or PSR. PSR postulates that altering the subcellular location of duplicate proteins can have dramatic effects on function through the change in its metabolic environment. Thus any mutation that redirects proteins to different locations within a cell can potentially lead to the functional diversification of duplicate genes. We are focusing on the N-terminus target peptide (NTP), a region consisting of about 13-36 amino acids and known to play a central role in subcellular targeting. A prediction that emerges from PSR is that duplicate gene pairs should demonstrate a predilection for changes in the NTP. Our current research involves wide-scale genomic analyses of ten eukaryotic species. We examined the NTP regions of gene pairs from each of these ten genomes and have found evidence supporting the above prediction. Our results are consistent with PSR as a significant mechanism for duplicate gene retention and functional diversification.

59)

### **The influence of *Rhamnus cathartica* (Common buckthorn) on leaf litter fall patterns at Rice Creek Field Station, Oswego, NY**

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Temperate deciduous forest edges are ecotonal communities that have distinct species abundance patterns compared to adjacent communities. These transitional edge communities are often colonized by non-native vegetation. At Rice Creek Field Station (RCFS), Oswego, NY, *Rhamnus cathartica* is a dominant, invasive understory tree found in edge and interior forest communities. We used leaf litter traps (n=48) at three selected sites in RCFS to determine the rate and composition of litter fall weekly from 1 October to 19 November 2008. We recorded the mass of forest matrix litter (native trees and exotic, non-*Rhamnus* shrubs) and *Rhamnus cathartica* leaf litter at each site to describe patterns in the timing of litter fall for *Rhamnus* compared to its neighboring species. Total leaf litter biomass across the three sites was not significantly different ( $P>0.05$ ). However, there was a significant ( $P<0.05$ ) difference in the timing of total litter fall between sites. Two peaks of litter fall, one for forest matrix community and a less pronounced later peak for *Rhamnus* were evident. Differences were apparent between sites and timing of litter fall ( $P<0.05$ ) based on the relative frequency of *Rhamnus*. Non-*Rhamnus* trees and shrubs shed their leaves earlier and in greater abundance, possibly in relation to freezing temperatures. *Rhamnus* has a tendency to withstand freezing temperatures and release leaves later in the fall. Future research will investigate the quality of litter fall by *Rhamnus* that may influence temporal patterns of carbon availability in forest communities.

60)

### **Amphibian and reptiles of the Southern Pantanal, a collaborative survey between SUNY Oswego and the Universidade Federal do Mato Grosso do Sul, Brazil**

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The population of amphibians and reptiles in the neotropic is underestimated. Brazil has a vast amphibian population (2<sup>nd</sup> in the world) which reinforces an urgent need of research to know it, as well as to understand the pattern of diversity and other factors related to the natural history of the tropical herpetofaunistic population.

The Brazilian Pantanal, a highly biodiverse region is influenced by neighbors biomes such Amazon, Atlantic Forest and *Cerrado*. However, one of the most intriguing factors is the seasonal population due to several factors, amongst them, the hydrologic regimen, which results in several *Pantanaís* or sub regions with distinct flooding pattern.

For the past decade, several Brazilian universities are working to survey the Brazilian Pantanal which will guide governmental decisions for conservation purposes. Last summer 6 SUNY Oswego students were part of these efforts as a goal to understand global environmental conservation issues. This work will present the results of our expedition to survey the amphibian and reptiles of the Southern Pantanal, a collaborative work between SUNY Oswego and the Universidade Federal do Mato Grosso do Sul, Brazil.

61)

### **The Association Between Blood Cholesterol and Enzymes of the Cardiovascular System**

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High levels of blood cholesterol and triglycerides are associated with an increased risk of cardiovascular disease. These blood components are generally thought of as affecting the cardiovascular system by narrowing blood vessels and increasing the workload of the heart. However, this may not be the only mechanism by which excess cholesterol and triglycerides affect the cardiovascular system. Our laboratory has recently found a novel relationship between plasma cholesterol and triglycerides and the enzyme kallikrein, which is responsible for the production of vasodilating mediators. Other studies have found a similar relationship between cholesterol and triglycerides and another enzyme, factor XII, which is responsible for production of kallikrein. We are currently measuring factor XII in our samples to test the hypothesis that factor XII is the link between the correlations we see between kallikrein and cholesterol and triglycerides. Current results of the project as well as their possible implications for the cardiovascular system will be presented.

62)

63)

### **Estimating Fisher Populations Based on Microsatellite Analysis**

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Fishers (*Martes pennanti*) are solitary, carnivorous members of the mustelid family. Data concerning fisher populations are scarce which makes estimating their current numbers and setting trapping regulations very difficult. Capture and release methodologies for identifying individuals are outmoded as fishers will become distressed from repeatedly being captured, sedated and sampled. 69 fishers were captured in the King's River region of southern Sierra Nevada, tagged with microchips and had their DNA genotyped. Hair samples from 14 fishers were also acquired from hair snares alone, the goals of this study are to genotype these samples and to compare them with DNA of the 69 live-captured animals. After the re-optimization of the primers for 3 different loci, the DNA was successfully amplified and genotyped for all 14 fisher hair samples. The findings from these experiments will help to establish a population estimate for fishers in the region and also identify possible corridors in Sierra Nevada. Similar methods will be employed in the Champlain Valley of Vermont, also to determine movement corridors for this species. In addition to enumerating the fisher population in general, it is hoped that this research will be able to develop new methods for, or improve upon current methods of obtaining DNA samples from individual mammals.

64)

### **The temporal association between yawning and brief handling stress in budgerigars**

*(Melopsittacus undulatus)*

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Yawning has been associated with stress responses in a number of species, including non-human primates and Siamese fighting fish. Neither the yawn's function in this context nor the stimulus for yawning is fully understood. Yawning has a thermoregulatory component, suggesting that yawning may mitigate the metabolic heat produced during a stress-response. To investigate the temporal association between yawning and stress, we netted individual budgerigars (*Melopsittacus undulatus*) from their aviary group and briefly held each for 4 minutes. We then released each into a small cage and measured the incidence of yawning over a 30-minute period (experimental). For comparison, we measured yawning by the same bird during a second 30-minute period the next day (control). We split the 30-minute observation periods of each condition into two 15-minute intervals. Results reveal that yawns per 30 minutes do not differ between experimental and control condition. Yawns appear, however, to be suppressed during the first 15 minutes after handling, then show a compensatory increase during the second 15 minutes. The stress of handling appears to have a biphasic effect on yawning—first a period of suppression, followed by a period of recovery. We hypothesize that yawning is maladaptive during an acute stressor (e.g., predatory attack). When sympathetic activity returns to baseline however, the chance of a second attack may remain high and then yawning may act to increase vigilance.

65)

### ***In Vitro* Studies of Stromal Influence on Epithelial Proliferation in Prostate Carcinogenesis**

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Investigations of prostate carcinogenesis have traditionally focused on the characteristics of the epithelial cells which undergo malignant transformation. However, it is now evident that paracrine interactions between epithelial and stromal cells critically influence prostate carcinogenesis. In this study, the hypothesis that cyclical paracrine communication is necessary for stromally-induced proliferation of both normal and malignant prostate epithelial cells was investigated. In one experiment, normal (RWPE-1) or malignant (NB26) human prostate epithelial cells were plated onto porous inserts which allowed for exchange of soluble factors. Inserts were then placed in K-SFM growth medium (control) or prostatic myofibroblast (WPMY-1)-conditioned medium (MCM). In a separate experiment, RWPE-1 or NB-26 cells were cocultured with WPMY-1 cells. Epithelial cells were counted four days after plating. RWPE cell growth in MCM was inhibited by 50% relative to control, while their growth in coculture was stimulated by 220%. Growth of NB26 cells in MCM was inhibited by 13%, while proliferation of these cells in coculture was stimulated by 141% relative to control. These results suggest that a) myofibroblasts need to be in the presence of epithelial cells in order to produce certain epithelial mitogens, and b) grown in isolation, prostatic myofibroblasts produce factors that can inhibit proliferation of normal and malignant prostatic epithelium.

66)

### **The Effects of Antibiotics upon Sterility of *Wolbachia* Infected *Drosophila paulistorum* Hybrids**

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Crosses of the *Wolbachia* strain DpLE infected Amazonian and Orinocan *Drosophila paulistorum* semispecies have to date produced F1 hybrids consisting of fertile females and sterile males. The endosymbiont *Wolbachia* causes reduction of sperm production and motility manifested as cytoplasmic incompatibility. Dr. Wolfgang Miller, Medical University of Vienna, prepared four crosses yielding hybrids from pure Amazonian mothers and Orinocan fathers, represented by *Wolbachia* infected lines with and without eight generations of oral 0.1% Rifampicin treatment. Partial rescue of male fertility was observed only when fathers were treated, illustrating paternal effects, though routine maternal transmission effects were present, as in previous experiments. Pure Orinocan and live F1 males were received from Dr. Miller, dissected in physiologic insect saline to observe phenotypic indications of reproductive health. Observations were made using a Zeiss light microscope and photographed. In all observations motile sperm was absent, supporting sterility. Size and pigmentation of the testes varied, some approaching normalcy, indicating the possibility of partial rescue via antibiotics.

67)

### **Comparison of Small Mammal Abundance and Distribution in a Transitional Oak Stand, Jack Pine Barren, and Northern Hardwood Forest Stand**

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Small mammal abundance and distribution were compared in a transitional oak stand, Jack pine barren, and northern hardwood forest stand. Fifty Sherman live traps were set in each, the northern hardwood forest and Jack pine barren, and 10 traps in the transitional oak stand. There were 32% more captures in the hardwood stand than in the Jack pine barren, and 81% more in the hardwood than in the transitional oak. All stands were dominated by *Blarina brevicauda* and *Peromyscus* spp., suggesting that these species are habitat generalists. As species diversity increased across the transitional oak, Jack pine, and northern hardwood stand, evenness marginally declined. The masked shrew (*Sorex cinereus*) and red-backed vole (*Clethrionomys gapperi*) were found to frequent sites with higher moisture content. The woodland jumping mouse (*Napaeozapus insignis*) frequented the deciduous environment due to its available resources, including succulent plant parts. The Northern flying squirrel (*Glaucomys sabrinus*) and the Eastern chipmunk (*Tamias striatus*) both demonstrated selected the hardwood stand not only for its composition, but also for its structure. This study established habitat preferences of small mammals in three diverse sites and provides baseline information for further research of small mammal populations on a flat rock pine barren.

**68)**

**The lineage of the Maya skeletons via mitochondrial DNA**

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The Old World introduced a number of pathogens and genes into New World populations after contact. Old World thalassemia is one such possibility. However, we have observed, both anatomically and possibly genetically, a strain of beta Thalassemia among Maya in a collection of six hundred Maya skeletons, from the in 16<sup>th</sup> and 17<sup>th</sup> century Tipu site excavated by Mark N. Cohen in the 1980's and now housed at SUNY Plattsburgh. Based on our current findings (and among possible alternate hypotheses), we are researching the possibility that the mutation was of New World Origin (suggesting future research for a counter-selective condition that helped spread the beta thalassemia in the New World independent of Old World transmission). The purpose of my research is to trace the lineage of the Maya skeletons back in time through the use of mitochondrial DNA and previously established migration routes of ancient peoples. My results could help establish that the rare strain of beta thalassemia was indeed linked to the Maya people, by helping eliminate the counter hypothesis of European (more specifically Spanish) transmission. The fact that the mutation is only found in individuals of haplotype D (a minority of the population) greatly strengthens the argument for a New World Origin.