



PRIVATE COLLEGE **SCHOLARS** *at the Capitol*

**RECOGNIZING
UNDERGRADUATE
STUDENT RESEARCH**

Wednesday, February 22, 2012

Welcome

Undergraduate research provides opportunities for students to explore the kinds of projects they will pursue later in their educational paths and careers. A strong commitment to undergraduate research is one of the reasons why more than half of Minnesota college students who attain a doctorate degree have earned their baccalaureate degree at one of the 17 nonprofit institutions that are members of the Minnesota Private College Council.

The 2012 Private College Scholars at the Capitol event celebrates 39 students' scholarship and the efforts of their faculty advisors. From sociology to biochemistry, environmental studies to mathematics, the breadth of the subject matter presented here represents the wide range of student learning that occurs every day at Minnesota's Private Colleges.

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Cover illustration by Taisha Boshner '12
MINNEAPOLIS COLLEGE OF ART AND DESIGN



Photo by Stephen Geffre

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Building an Infrastructure to Recognize an Image's Evoked Emotion

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AUGSBURG COLLEGE

Facial emotion recognition is a subfield of computer vision. A facial emotion recognition system is a computer application for identifying or verifying a person's emotion from a digital image or a video frame. This research focuses on building a facial emotion recognition infrastructure. A facial emotion recognition algorithm is implemented and used to analyze images to determine whether a given facial image is classified as "happy" or "not happy." This type of research is important to the development of robotic systems that interact with humans and is also being used for advertisement studies.

Mesoscale Nanopatterning Using Lipid Surfactant Templating

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Nana Owusu

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AUGSBURG COLLEGE

Contemporary research in the field of nanotechnology has demonstrated the self-assembly of nanoparticles. They spontaneously form patterns guided only by interactions among themselves and with their environment. There are various methods being investigated by researchers to template nanoparticles and transfer the patterns onto a solid substrate. This project explores the use of lipids on a Langmuir trough to organize nanoparticles at the air-water interface as well as the Langmuir-Blodgett technique to deposit the resulting monolayer. The model system that was created employed the lipid dipalmitoylphosphatidylcholine (DPPC) as a templating agent for dye-loaded polystyrene nanoparticles with a negatively charged surface. Both fluorescence microscopy and atomic force microscopy analyses of the deposited monolayers show evidence of nanoparticle patterning by DPPC. The results of this study warrant further investigation of the technique by extending the system to different lipids, nanoparticle compositions and nanoparticle surface chemistries.

Influence of Aspartame on Integrin-Mediated Cell Adhesion to Solid Substrata in Human Epithelial Kidney Cells

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Integrin-mediated cell adhesion is vital for a variety of cellular processes including signaling, proliferation and motility. These transmembrane proteins consist of alpha and beta subunits that recognize arginine-glycine-aspartic acid motifs in the extracellular matrix. The anti-diabetic drug, aspartame, possesses a similar dipeptide recognition sequence and was previously shown to differentially regulate genes in cell adhesion signaling pathways. In this study, aspartame-treated kidney cells were quantitatively assayed for adhesion to substrata in a dose-response format. Results showed no significant difference in the percentage of viable cell attachment, suggesting that soluble aspartame does not inhibit cell adhesion to the extracellular matrix. However, the number of focal contacts for aspartame-treated cells demonstrated a significant dose-dependent increase compared to untreated cells. To test whether focal contact formation is mediated by integrin receptors, an Elisa-based assay was used to screen for differential surface expression of alpha and beta integrins. Notably, the $\beta 2$ and $\alpha 5\beta 1$ subunits showed a reproducible upregulation of protein expression for treated cells compared to untreated cells. Taken together, these data suggest that soluble aspartame stimulates the formation of focal adhesions through some members of the integrin family of transmembrane receptors, but does not competitively inhibit stable adhesion to solid substrata.

A Correlational Study of First-Year and Transfer Division III Football Players in Relation to Traumatic Brain Injury Baseline Testing

STUDENTS

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The goal of this study is to further validate the Sports Concussion Assessment Tool 2 (SCAT2) in regards to “The 3rd International Conference on Concussion in Sport” by correlating complex cognitive motor reaction time. Data was collected from 32 male first-year/transfer Bethel University Division III football players ages $18.66 \pm .13$ (mean weight= $89.55\text{kg} \pm 2.29$, mean height= $183.23\text{cm} \pm 1.18$). The subjects completed SCAT2s. Within three weeks of this data collection, complex cognitive motor reaction board testing results were collected. Reaction time (RT) was obtained through a test on a motor board through red light stimulus and finger tap response. The motor board was calibrated before each session. The total SCAT2 ($M=73.03 \pm 0.808$) and RT ($M=490.81\text{ms} \pm 16.26$) scores of individuals were analyzed from the data. The results were compared and analyzed using Predictive Analytics Software (PASW). A Pearson Correlation demonstrated a positive correlation ($r=.444$, $r^2=.197$, $p=.005$) between SCAT2 and RT. This study concludes there is a relationship between total SCAT2 scores and RT. This allows for medical staff to use RT testing as an additional diagnostic tool, comparing baseline values with post-assumed traumatic brain injury (TBI) occurrence. The researchers can also see applicability in helping with return to play criteria and helping prevent further brain damage.

Plant Functional Group Dynamics Over Time in Prairie Restoration

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CARLETON COLLEGE

Tallgrass prairie was a dominant ecosystem in the pre-agricultural Midwest, but the vast majority of prairie has been lost to development and agriculture. Recently, there has been an interest in restoring these tallgrass ecosystems; however, there is very little data on the dynamics of these restorations. This project is a preliminary analysis of a long-term data set tracking plant functional group dynamics over time in Carleton's prairie restoration. The study site is comprised of 13 fields that were converted from agriculture to prairie at the rate of one field per year from 1995 to 2007. The plant species composition of these fields has been measured every other year since 1995. For data analysis, species were sorted into functional groups based on their ecological role in the system. This study compares data gathered in 2000 with data gathered in 2008, in order to find patterns in functional group cover over time across different field sites. Our findings suggest that the abundance of different functional groups is controlled by multiple factors, including successional time, ecological conditions specific to location and year-to-year variation.

Speech Surrogates of the White Hmong: A Study of the Representation of Hmong Tones as Musical Pitches on the *Nkauj Nog Ncas*

STUDENTS

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CARLETON COLLEGE

When Hmong musicians perform, elders know that the music goes beyond its melodic content to communicate words, phrases and emotion. However, all we heard were melodies, which encouraged us to explore this phenomenon. Specifically, this research centers on the little-studied *nkauj nog ncas*, exploring the relation of pitch to linguistic tone and thus to meaning. Relationships between tone and pitch have been analyzed by Poss (2005) with the flute, by Catlin (1981) with sung poetry and by Falk (2003) with the open-reed pipe organ. These researchers' pitch system was applied in the tone-to-pitch mapping and to tones collapsing into one pitch of the violin. About 800 words were analyzed, forming a pattern of high tones to high pitches and vice versa; the collapse of tones into one pitch suggests that tone assists in understanding the instrument. We also discuss additional factors, like the style of "speech," which aid in comprehension. In documenting the pitch-tone relationship in the music of this previously ignored instrument, this project contributes to the study of Hmong linguistics and music and brings validity to tone as a factor in understanding Hmong instruments. We also hope that Hmong youth acknowledge, continue to explore and preserve the unique skills of Hmong culture.

Environmental Citizenship in the Media Age

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**COLLEGE OF SAINT BENEDICT
SAINT JOHN'S UNIVERSITY**

This project investigates how environmental advocacy groups and companies engage citizens on environmental issues. Using case studies, research was conducted on the purpose of the required persuasion, the rhetorical constraints the persuader needed to overcome, the techniques the groups used to convey their message and the outcome of the persuasion. The three case studies used were Environmental Defense's "Train" advertisement, 10:10's "No Pressure" advertisement and Nissan Leaf's "Hugging Polar Bear" advertisement.

Public Art and Social Change in Latino/Latin American Culture

STUDENT

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**COLLEGE OF SAINT BENEDICT
SAINT JOHN'S UNIVERSITY**

This research is based on my Honors Thesis project, "Public Art and Social Change in Latino/Latin American Culture," which was inspired by a study abroad experience in Chile in 2010. There I learned about activist public artists, such as the group Colectivo Acciones de Arte (CADA) and the muralist brigade La Brigada Ramona Parra. After returning to the U.S., I became motivated to deepen my knowledge of modern muralism in the Americas, beginning with the Mexican Mural Renaissance of the early 20th century. Specifically, I wanted to explore collaboration with the community during the mural process, both in the ideation and creation. In the summer of 2011, a partnership with Casa Guadalupe Multicultural Community (CGMC) was formed to organize a community mural for the city of Cold Spring, Minn. The mural's goal was to reflect the identity of Latinos in Cold Spring and create a culturally inclusive visual celebration of the town's history. The collaboration with youth and community members during brainstorming and painting sparked many conversations that built cross-cultural relationships. After the mural's completion, these relationships developed further through the conducting of art workshops for youth, centered on themes such as identity and place.

Cloning and Characterization of Organic Anion Transporting Polypeptides

STUDENT

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THE COLLEGE OF ST. SCHOLASTICA

Organic Anion Transporting Polypeptides (OATPs) are sodium-independent solute carriers with 10-12 membrane spanning alpha-helices. Most OATPs are expressed in a wide variety of tissues including the blood-brain barrier, kidney, liver and intestine and have a wide array of substrate specificity. Others have discrete expression with specialized substrates. OATPs operate by way of anion exchange and possibly pH dependency, with stimulation occurring at acidic levels. They are involved in both influx and efflux of numerous compounds including bile salts, hormones and various drugs. For this research, focus was put on OATP1B1, OATP3A1, OATP4A1, OATP5A1 and OATP6A1. This research is important because these members show a high conservation with ancestral OATP sequences such as those found in the primitive organisms *Nematostella* and *Tricoplax*. Also, some OATPs have also been shown to be over-expressed in certain cancers such as colon, liver and hepatic cancers. Finally, there has been very little research performed on these OATPs. The information gathered in these studies may help identify what substrates OATPs originally evolved to recognize and to therapeutically target OATPS expressed in cancer cells.

Exploring Attachment, Social Support and Parental Authority in Relation to Resiliency and Self-Compassion

STUDENT

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Several psychological constructs are associated with students' health and well-being (e.g., resiliency and self-compassion; Leary and Hoyle, 2000). Some research suggests that self-compassion may even promote resiliency (Neff and McGehee, 2010). Other research supports a relationship between resiliency and self-compassion with family systems-based constructs (e.g., attachment, social support and parental authority; Neff, Hsieh and Dejitterat, 2005). Previous literature examined the relationship between resiliency and family constructs and the relationship between self-compassion and family constructs. When students come to college, some of the constructs such as self-compassion and resiliency are still developing, while others, such as those associated with family, are more solidified. Therefore, it can be inferred that a student with a deficit in one of the constructs could, consequentially, have deficits in one or more of the other constructs. The purpose of this study was to explore relationships between the family constructs, between self-compassion and resiliency and between all of the constructs as a whole.

Discrete Approximations of Differential Equations via Trigonometric Interpolation

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**CONCORDIA COLLEGE,
MOORHEAD**

To approximate solutions of a linear differential equation, its solution space was projected via trigonometric interpolation onto a finite dimensional space of trigonometric polynomials; a matrix representation of the differential operator associated with the equation was also constructed. The ranks of the matrix representations of a certain class of linear differential operators were computed. Our numerical tests showed high accuracy and fast convergence of the method applied to several boundary and eigenvalue problems.

Resisting the Official, Re-Empowering the Vernacular: Cultural Amnesia and Conflicting Landscapes in Works by Devi and LaDuke

STUDENT

Caitlyn Schuchhardt

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**CONCORDIA COLLEGE,
MOORHEAD**

Social and environmental justice are often considered to be separate categories, but they are inherently connected. This connection becomes clear when one looks at the history of injustices that have been committed against indigenous people throughout the world. By exploring the social and environmental injustices facing indigenous people in both the U.S. and India, this project bridges the gap between these two worlds and identifies how globalization and neocolonialism are damaging not only indigenous people, but the environment as well. Through conducting a postcolonial ecocritical literary analysis of Mahasweta Devi's *Imaginary Maps* and Winona LaDuke's *Last Standing Woman*, this project shows how both Devi and LaDuke wrote in acts of resistance against what is called the "official landscape," a landscape that is driven by profit and sees the earth as only a resource. They have revealed to us society's cultural amnesia, an amnesia that has allowed us to forget the importance of the "vernacular landscape," a landscape rooted in humans' connection to nature and in the values and cultural traditions of indigenous people. This project was shaped by the researcher's experience in the U.S. and a semester in India, where she studied social and environmental justice issues.



Nana Owusu (**Augsburg College**) next to his Langmuir trough setup in the biophysics lab. **PAGE 5**



Caitlyn Schuchhardt (**Concordia College**) with Narayani and Lakshmi, two adivasi women from the Kaatu Naicker tribe in Wayanad, Kerala, India. **PAGE 15**

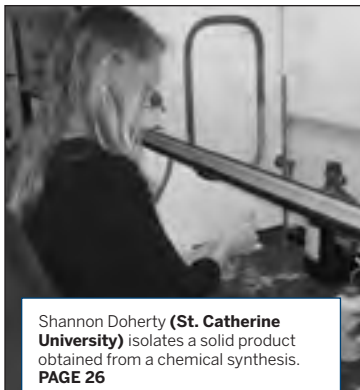


Sarah Nelson (**University of St. Thomas**) presents her research at the "Inquiry at UST" poster session. **PAGE 32**

PHOTOS



Phoua Xiong, right (**St. Olaf College**) and her faculty mentor, Dr. Heather Campbell. **PAGE 29**



Shannon Doherty (**St. Catherine University**) isolates a solid product obtained from a chemical synthesis. **PAGE 26**

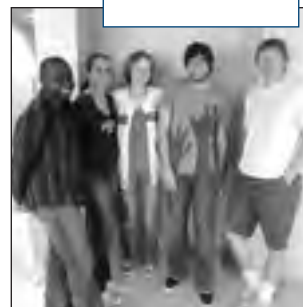


John Schmidt (**Gustavus Adolphus College**) studying the vibration of a microcantilever using the ultrasound radiation force. **PAGE 20**

Dr. Borgerding's Lab, Chemistry Department at the **University of St. Thomas**. Pictured from left to right: Godino Kalungi, Elizabeth Annoni, Daphne Welter, Zach Henseler, and Dr. Tony Borgerding. **PAGE 30**



Student researchers display traditional Hmong instruments, the subjects of their study. Clockwise from top: Bill Vang with the Jew's Harp, Bao Vue with the flute, Pachee Vang with the two-stringed violin and Milah Lah Xiong with the Bamboo Leaf. (**Carleton College**) **PAGE 9**



Virginia Ma, right (**St. Olaf College**) and her faculty mentor, Dr. Kim Kandl. **PAGE 28**



Comparing the Effectiveness of Household Cleaners in Preventing *E. Coli* Growth on a Surface

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and Daanish Khan

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**CONCORDIA UNIVERSITY,
ST. PAUL**

The purpose of this experiment was to determine how well household cleaners inhibit the growth of *E. coli* bacteria on a surface. We were interested in the following questions: 1) What is the most effective disinfectant? and 2) Do household cleaners really kill 99.9% of bacteria, as often claimed in advertising campaigns? The following cleaners were tested: Clorox spray, antibacterial hand soap, Lysol, and dish soap. *E. coli* were spread onto a 3" by 3" area of a lab bench and exposed separately to the various disinfectants. Bacterial growth was assessed using swabs and test counters grown in a 37 degrees Celsius incubator for 48 to 72 hours. Bacterial colonies were counted to determine the ability of each cleaner to inhibit microbe growth. It was expected that every household cleaner would kill some amount of bacteria but that Lysol would be the most effective. After running five trials, analyzing the data and subjecting it to confidence interval statistics, we concluded that there was a statistically significant difference between dish soap and hand soap, but not between Lysol and Clorox. Lysol was the only cleaner to kill all of the bacteria.

Developing a Method to Regulate Production of Authentic mRNAs in Yeast

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GUSTAVUS ADOLPHUS COLLEGE

The yeast *Saccharomyces cerevisiae* regulates galactose-metabolizing enzymes through a genetic switch consisting of regulatory proteins and a DNA sequence called an upstream activating sequence (UAS). The switch promotes transcription in the presence of galactose and suppresses transcription in the presence of dextrose. This switch-mediated regulation can be conferred to other genes by fusing the UAS from the GAL1 gene to a gene of interest. Our goal is to develop a systematic method for fusing the GAL1 UAS to a gene of interest, such that the fusion produces authentic mRNA. Our approach was successfully applied to the CTF13 gene. To test the transferability of our approach, we used the method on the PPR1 gene. A DNA plasmid containing the fusion was transformed into yeast. Yeast transformants grown in galactose media showed a tenfold increase in PPR1 mRNA abundance compared to those grown in dextrose media, confirming the expected function of the GAL1 UAS. Our next step is to assess the authenticity of the mRNA by determining the transcription start site of the GAL1 UAS-PPR1 fusion. Confirming the effectiveness of a systematic approach for making GAL1 UAS gene fusions will offer a reliable tool for further research, especially that on mRNA decay.

Noncontact Excitation of Vibration Using Ultrasound Radiation Force

STUDENTS

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GUSTAVUS ADOLPHUS COLLEGE

Understanding how objects vibrate is important in many areas of industry, science and engineering. In some cases, such as musical instruments, vibrations are essential because they produce desired sounds. In other cases, such as components in a hard drive or aircraft, undesired vibrations can lead to failure. Traditional methods for studying vibration require attaching a mechanical shaker to the device under study. For some systems adding a mechanical shaker may be difficult; the additional mass of the shaker can also result in incorrect measurements. In collaboration with researchers at the Mayo Clinic in Rochester, Minn., a technique has been developed for this project that uses a combination of ultrasonic waves to vibrate objects without any physical contact. This ultrasound radiation force method eliminates some of the problems inherent in traditional methods for vibration testing. In this ongoing project, this technique has been used to vibrate objects ranging in size from an acoustic guitar to microcantilevers that are a third the diameter of a hair and vibrate more than two million times each second. Industrial applications of this ultrasound excitation technique include working with engineers at Hutchinson Technology (Hutchinson, Minn.) to study vibration of hard drive suspensions and Electro-Voice/Bosch (Burnsville, Minn.) to study microphones and speakers.

Wind on the Horizon: The Politics and Psychology of Wind Energy Development in Michigan

STUDENT

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The Michigan Wind Energy Landscape Symposium, which was held in Manistee and Benzie Counties in June 2011, was designed to tease apart the many local opinions and concerns about wind energy development in the area. It facilitated an informative, civil conversation among a small portion of residents and together these participants developed an ideal list of best practice principles for acceptable wind energy planning and siting in the counties. The symposium also explored how a deliberative process could build consensus and influence policy; our results indicate that participants generally convened around a more nuanced opinion of wind energy over the course of the day. In addition to the symposium, mail-out surveys captured a larger sample of local opinions and emotions toward wind development. These results show that residents were largely split in their opinions about wind energy development and many people reported either strong support for or adamant opposition to it. This further contributes to the observation that residents of this area feel strongly about wind energy one way or another and indicates the usefulness of community discussion and local involvement in helping society come to an agreement about a topic as controversial as wind energy.

The Neural Correlates of Adaptive Information Acquisition

STUDENT

Pierce Edmiston

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THE UNIVERSITY OF IOWA

Gathering information about a variety of options is an important step to knowledgeable decision-making. Different modes of gathering information can be used depending on the decision-making situation. The neural correlates for adaptively implementing these differing strategies are currently not known. In this project, the lesion-deficit approach to explore the neural correlates of adaptive information acquisition was used. It was hypothesized that patients with damage to the hippocampus (HC) would demonstrate increased attribute-based information acquisition when compared to comparison subjects. In addition, it was hypothesized that patients with damage to the ventromedial prefrontal cortex (vmPFC) would demonstrate increased option-based information acquisition when compared to comparison subjects. The results suggest that with further data collection, the predicted roles of target neural regions will be supported — that the HC mediates option-based search while the vmPFC mediates attribute-based search. However, the results do not support the hypothesis that these neural regions are necessary for adapting different information acquisition modes based on the difficulty of the decision.

Identification of Novel Inhibitors of Low Molecular Weight Tyrosine Phosphatase via Virtual Screening

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**SAINT JOHN'S UNIVERSITY
COLLEGE OF SAINT BENEDICT**

The human low molecular weight protein tyrosine phosphatase (LMW-PTP) has been identified as a target for inhibition to downregulate metastatic transformation and invasivity in several human cancers such as breast, colon, bladder and kidney. A docking algorithm program, Glide, was used to perform extra precision docking on both isoforms of LMW-PTP to virtually screen 1,356 compounds from the National Cancer Institute (NCI) diversity set II for new potential inhibitors. Twenty-one compounds identified as potential inhibitors by in silico screening methods were acquired from NCI. The compounds were kinetically analyzed on LMW-PTP isoform B to validate their selection as potential inhibitors. Both in vitro and in silico results are presented.

The Effects of Atrazine on BMP4 Protein Levels in Liver and Serum Isolated From *Phasianus Colchisus* and *Gallus Gallus*

STUDENT

Alex Braun

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Dr. Debra Martin

Department of Biology

**SAINT MARY'S UNIVERSITY
OF MINNESOTA**

Atrazine is a widely used herbicide. Currently the EPA has set the maximum level for atrazine at 3 ppb. Groundwater and streams near agricultural sites may contain traces of atrazine. Studies have shown that atrazine exposure can have a negative effect on overall health, including decreased packed cell volume and decreased levels of BMP4 in serum of chickens developing *in ova*. The purpose of this study was to analyze the effects of atrazine on BMP4 protein levels in liver and serum isolated from pheasants and chickens after hatching. The chicks were exposed to atrazine for a three-week period. A Western Blot was completed to identify the molecular weight of the avian BMP4. Also, an ELISA kit (R&D Systems) was used to detect the amount of BMP4 proteins found in the extracts. It was found that the average pg/mL of BMP4 in pheasant serum decreased as atrazine concentration increased, 30.2 pg/mL for Control, 7.46 pg/mL for 30 ppb atrazine and 6.84 pg/mL for 300 ppb atrazine. Interestingly, there was an increase in the amount of BMP4 found in liver samples, 22.1 pg/mL for Control, 54.3 pg/mL for 30 ppb atrazine and 75.5 pg/mL for 300 ppb atrazine. Data for the chickens were similar. The data give support that atrazine has an effect on BMP4 levels, which could influence the hemopoietic system.

The Anti-Inflammatory Effects of Glycerol Monolaurate on TPA-Induced Inflammation in *Mus Musculus*

STUDENTS

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**SAINT MARY'S UNIVERSITY
OF MINNESOTA**

Glycerol monolaurate has been shown to inhibit production of the pro-inflammatory cytokine, tumor necrosis factor- α (TNF- α) *in vivo*. Since TNF- α plays a significant role in the symptoms of inflammatory diseases such as rheumatoid arthritis (RA), glycerol monolaurate may be a potential treatment for diseases like RA. Topical treatment with phorbol ester 12-O-tetradecanoylphorbol-13 acetate (TPA) on the ear of a mouse causes inflammation and therefore serves as an animal model to study inflammatory disease. Studies have shown that the inflammation induced by TPA is largely due to increased production of TNF- α (Murakawa, 2006). The purpose of this study was to determine whether treatment with glycerol monolaurate could reduce TPA-induced inflammation in a mouse model. The ears of mice were treated briefly with TPA and/or glycerol monolaurate and six hours after treatment, the mice were euthanized and tissue from each ear was collected. The tissue samples were then weighed; an increase in weight (due to fluid retention) was indicative of inflammation. Results indicated that while TPA treatment did cause significant inflammation, treatment with glycerol monolaurate did not significantly reduce this inflammatory response. Based on these results, it is questionable whether glycerol monolaurate would be a candidate as a treatment for RA.

Synthesis and Structural Characterization of Cyclometallated Gold (III) Complexes

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The study of organogold complexes has drawn increasing interest as practical applications of this chemistry including antitumor activity have been discovered. With this in mind, this study explores fundamentals of structure and bonding in gold (III) complexes. Specifically, cyclometallated gold (III) square planar complexes were synthesized, incorporating 1,3,7-trithiacyclononane (9S3) ligands. These complexes were accessed through a scheme first involving the preparation of neutral intermediates of the form $\text{Au}(\text{N}^{\wedge}\text{CH})\text{Cl}_3$ ($\text{N}^{\wedge}\text{CH} = 2\text{-}(p\text{-tolyl})\text{pyridine}$, $2\text{-}(2'\text{-benzothienyl})\text{pyridine}$). These neutral noncyclometallated complexes were heated as neat solid complexes to induce cyclometallation. The cyclometallated complexes of the form $\text{Au}(\text{N}^{\wedge}\text{C})\text{Cl}_2$ were then reacted with 9S3 and metathesized to access the target complex salts of the form $[\text{Au}(\text{N}^{\wedge}\text{C})(9\text{S}3)](\text{PF}_6)_2$. These systems were characterized by numerous methods including one- and two-dimensional nuclear magnetic resonance spectroscopy, electronic spectroscopy, thermogravimetric analysis, differential scanning calorimetry and X-ray crystallography.

Hmong-American Food and Health Knowledge in Minnesota

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Food and health issues in Hmong-American communities have drawn attention from health researchers and community members. The purpose of this study was to explore how Hmong-Americans in Minnesota acquire their food and health knowledge and to identify barriers in maintaining healthy lifestyles. We conducted four interviews and three focus groups with seven people (ages 17-46) and participated in Hmong family and community gatherings to observe food practices and dialogues about food and health. We found that Hmong-American food knowledge is heterogeneous by generation, class, gender and religion, that acquisition of knowledge comes from multiple sources including school, media, friends and family and that barriers to maintaining healthy lifestyles include financial and safety issues, time conflicts, lack of access to food, lack of space for physical activities and pressure to conform to mainstream norms regarding food and lifestyle. Our findings challenge the notion that education of disadvantaged communities is the main solution to current health disparities. Recommendations for interventions of behavior changes in Hmong-Americans should take into account that this population has a rich repertoire of knowledge about food and health and is aware of the barriers they face to maintaining a healthy lifestyle.

Interaction Between Actin and Translation Factor eEF3 in *Saccharomyces Cerevisiae*

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There have been numerous studies that suggest actin plays a role in translation, the final step in gene expression, but the molecular details of these interactions remain unknown. The best evidence that translation factors interact with actin is that the protein eEF1A has been found to bind and bundle actin filaments. In previous research, the actin mutation act1-122 was identified to be super-sensitive to the drug paromomycin, and a genetic screen was performed to identify proteins that suppress the paromomycin sensitivity of the mutant. This screen identified the gene YEF3, which encodes translation elongation factor 3 (eEF3). eEF3 stimulates eEF1A and affects the delivery of tRNA to the ribosome. The previous study suggests that the protein eEF3 is associated with act1-122, but it is unknown whether or not eEF3 directly interacts with actin. This project continues the study of the relationship between eEF3 and actin in translation. In the lab, eEF3 was purified and experiments were performed to determine whether eEF3 binds to actin and the results were analyzed by SDS-PAGE. The results obtained from these experiments indicate that additional experiments are necessary to explore the actin-eEF3 interaction.

Metacognitive Strategies in Undergraduate Biology

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College students are often unable to regulate study strategies across disciplines and rarely change their study habits. Metacognitive strategies are designed to help students become self-regulated learners. The purpose of this study was to determine whether students who use metacognitive strategies study more effectively, perform better on exams and more accurately predict their exam scores. Half of the students participated in TRiO, a federally funded program for students who are first generation, low-income or who have disabilities. Prior to each exam, the experimental group answered metacognitive questions about study methods and predicted their exam grades. The control group defined terms and predicted their exam grades. A subset of the participants also took the Motivated Strategies for Learning Questionnaire (MSLQ) which measures students' use of metacognitive strategies. Results revealed that the metacognitive strategy intervention had no significant impact on exam grades; students who scored high on the MSLQ test anxiety measure tended to have lower exam scores. Additionally, TRiO students had difficulty predicting their first two exam scores, but by the third exam, they predicted with the same accuracy as their non-TRiO peers. Further research should be conducted on how the regular use of metacognitive strategies impacts academic success for different groups of students.

Improving Detection Limits (Extractions in the Gas Phase Using Microdialysis Probes)

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The purpose of this project is to improve detection limits of a rapid extraction system used for analyzing volatile analytes in aqueous solutions. The system used to analyze and monitor volatile analytes has three parts: extraction, concentration and analysis. First, the volatile analyte is extracted from the aqueous solution into the gas phase using microdialysis membranes. Next the analyte is trapped and concentrated within the extraction stream and then rapidly released. For this project, we developed an automated system to control the timing in order to trap and release the analyte. Within a silcosteel tube, the analyte is trapped on a solid sorbent and then desorbed using heat generated by a short pulse of current. This method has produced peak height signal enhancement by a factor of 20 to 50 over extractions without concentrations. This improvement decreases the detection limits of the gas chromatograph coupled with the flame ionization detector (GC-FID). The rapid analysis and lower detection limits for analyzing volatile analytes has many practical applications, including continuous monitoring of reactions as well as conducting blood tests, air and water quality tests and detecting diabetes.

The Impact of Urban Agriculture on a University Campus

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Two years ago, a coalition of students and faculty at the University of St. Thomas came together to create the on-campus “UST Stewardship Garden.” Motivated by a need for strong, just and local food production systems, its main goals were to provide a service to nearby low-income communities, to create research and educational opportunities for UST students and to build community relationships. After the first year of operation, an assessment of the project was sought. Through several surveys designed to measure the extent to which the garden’s goals were accomplished and how it has impacted campus, it was concluded that the garden project has enjoyed some degree of success. Its goals of service, education, research and community building are being accomplished and research is showing that involvement is having a positive effect on students’ knowledge and attitudes about environmental sustainability and food justice. Urban agriculture is becoming increasingly popular, with gardens seeming to pop up everywhere, yet not much empirical research has been conducted on their impact on campuses. This work strives to shed light on important societal issues — nutrition, fresh food scarcity in urban settings and the role of biodiversity — that will hopefully motivate similar projects and activities elsewhere.

Parenting and Children's Developing Views of Life

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The purpose of this research was to investigate family/parent factors that may influence the development of schemas during childhood. Schemas can be described as cognitive "lenses" in one's life, influencing the way one interprets situations, circumstances, people, places and things. Maladaptive schemas are schemas one holds that are inaccurate about the world and lead to unhealthy beliefs and/or lifestyles. Young's (1999) work with Early Maladaptive Schemas (EMSs) suggests that there are 16 maladaptive schemas, such as mistrust, emotional inhibition and unrelenting standards. Thirty male and 71 female university students completed a survey measuring their maladaptive schemas. They also completed questionnaires measuring several other variables: parental authority, family intrusiveness, parental overprotection and family autonomy and intimacy. The following variables were inversely related to the presence of EMSs: (a) parental authoritativeness, (b) family autonomy and (c) family intimacy. The following variables were directly related to the prevalence of EMSs in the research participants: (a) parental authoritarianism, (b) family intrusiveness and (c) parental overprotection. These findings revealed that parenting is a vital factor in the development of an individual's maladaptive perceptions of reality, a developmental fact that can have far-reaching consequences.

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