

# Undergraduate Symposium 2008

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*Celebrating Research, Creative Endeavor, and Service-Learning*

**University of Wisconsin–Madison  
Great Hall, Memorial Union  
April 16, 2008**

- 9:45 a.m.                      *Welcome to Student Participants*  
Aaron Brower, Vice Provost  
for Teaching and Learning  
Robert Skloot, Professor, Theatre and Drama
- 11:45 a.m.                      *Celebrating 10 Years*  
*of the Undergraduate Symposium*  
John Wiley, Chancellor  
Undergraduate Research Awards Ceremony

## **Oral Presentations, Poster Sessions and Performances**

Check the registration table outside the Great Hall on 4th floor for specific times and locations.

- 10–11:30 a.m.                      Session I: Oral Presentations
- Noon–1:30 p.m.                      Session II: Oral Presentations
- 2–3:30 p.m.                      Session III: Oral Presentations
- 10 a.m.–4 p.m.                      Posters and displays will be on view in  
Great Hall, Main Lounge, Capitol View  
and Langdon Room.

Performances will occur throughout the day in Great Hall.

Refreshments will be available throughout the day in Great Hall.

### *A Special Thanks!*

We would like to thank the faculty and staff for promoting academic and creative excellence and for making the Symposium possible through their roles as mentors and sponsors. We would like to thank the student participants and the many individuals who have helped to organize this symposium. It has been a great team effort.

A special thanks is also extended to Ruthi Duval of The Wisconsin Union; Melissa Tedrowe of the Writing Center; Ariane Strombom; Lori Berquam, Offices of the Dean of Students; Kent Hamele, Jeff Jerred, Linda Kietzer, Julie Olsen, and Nancy Rinehart of University Communications; Jeff Crucius and Rob Lauer of the Division of Information Technology; David Luke at the College Library; Karen Lederer; and Jan Lucchesi of the College of Letters & Science, Student Academic Affairs; and the team of students from the Accenture Leadership Center, School of Business.

#### *2008 Undergraduate Symposium Organizing Committee*

Noel Howlett (coordinator), Reneé Alfano, Jane Harris Cramer, Maya Holtzman, Svetlana T. Karpe, Linda Kietzer, Laurie Mayberry, Janice Rice, Julie Stubbs, Melissa Tedrowe, Randy Wallar.

*Cover photos provided by the Office of University Communications.*

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*University of Wisconsin–Madison*

*April 16, 2008*

The tenth annual Undergraduate Symposium is a celebration of undergraduate students' accomplishments across the many schools and colleges at UW–Madison. The Symposium includes presentations, posters, and displays by groups and individuals representing the arts and humanities, biological sciences, physical sciences, and social sciences. These original works showcase the vast range of talent and creativity within the university's undergraduate population.

## **Sponsors**

*Brittingham Trust*

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*The Wisconsin Union*

*Undergraduate Academic Awards Office*

*Undergraduate Research Scholars Program*

*Writing Center*



## **THE ROLE OF SOCIAL SUPPORT IN COPING WITH THE STRESS OF COLLEGE LIFE**

Tammi Albrecht, Leah Bretl, Stephanie Maas, Jaime Porter, and  
David Lambert (Mentor), Human Development and Family Studies

The increasing roles and demands associated with attending college can create significant stress in students' lives. In order to succeed, students need to cope with and manage the stressors involved in college life. The primary purpose of this study is to examine the effects of social support on coping with stress. Participants will include approximately 400 students, evenly distributed among gender and year in school, recruited by an online survey. Student stress will be measured using the College Life Stress Inventory (Renner & Mackin, 1998) and social support will be measured by the Social Provision Scale (Weiss, 1973). Data collection will be completed by April 6, 2008. We hypothesize that social support will buffer the negative effects of college-related stress.

## **DYNAMIN AND RHO-1 PLAY AN IMPORTANT ROLE DURING CYTOKINESIS IN *C. ELEGANS***

Amanda Amodeo, and Ahna Skop (Mentor), Genetics

Cytokinesis is the final phase of cell division in which a single cell is physically separated into two daughter cells. This is accomplished by constricting the actomyosin ring and inserting new membrane along the furrow. Dynamin is required for endocytosis and also regulates the dynamics of the actin cytoskeleton. We hypothesize that dynamin may regulate the actomyosin contractile ring. In order to test this hypothesis, we are using *in vivo* microscopy to determine the role of DYN-1 in regulating actin dynamics by using GFP-RHO-1 as a marker. These experiments will yield insight into the establishment and regulation of the contractile ring during cytokinesis.

## **ANALYSIS OF ESTATE PLANNING: BEST PRACTICES AND TOOLS REGARDING ESTATE PLANNING**

Alison Andreoff, Dirk Pearson, and Ann Kinkade (Mentor), General Business

Proper estate planning is a topic of concern for family business owners. This study examines ideal ways to accumulate and dispose of an estate to maximize the goals of the estate owner. This study will explore the recommended tools and practices to be implemented in the estate plan to ensure the greatest amount of the estate passes onto the beneficiaries. Our methods of research include personal interviews with an estate planning attorney and a financial planner, statistics, and case studies comparing a poor example of estate planning with a good example of estate planning. The results should reiterate the proper process of planning an estate while maximizing the goals of the estate owner. Furthermore this study examines the importance of planning one's future and wealth.

## **INTERACTION BETWEEN CAR-1 AND THE ENDOPLASMIC RETICULUM IN *C. ELEGANS***

Alex Antell, and Jayne Squirrell (Mentor), Molecular Biology

CAR-1 (cytokinesis apoptosis RNA), an RNA-associated protein, plays important roles in cytokinesis and in organizing the endoplasmic reticulum (ER). Evidence indicates that there's an interaction between CAR-1 and the ER in *Drosophila*, suggesting that CAR-1 helps localize RNAs close to the ER. To investigate whether a similar pathway is present in *C. elegans*, I have generated a plasmid that encodes for SP-12 (marker for the ER) and a red fluorescent protein. Worms were transformed with this plasmid to generate strains expressing this fusion protein in their germline and will be crossed with worms expressing a CAR-1::GFP protein. Imaging showing overlap of the two fluorescent proteins in embryos will provide support for the hypothesis that CAR-1 directly interacts with the ER.

## **THE ROLE OF THE IMMUNOCYTOKINE, KS-IL2, IN STIMULATING NK CELL MIGRATION TOWARD OVARIAN TUMOR CELLS**

Jennifer Arens Gubbels, Helen Holden, and  
Manish Patankar (Mentor), OB/GYN

Treating patients with KS-IL2 would be a way to help their immune system better fight off the ovarian cancer. KS-IL2 is a synthetic immunocytokine with a mouse variable region and a human FC region, with IL-2 attached to it. We hypothesize that when KS-IL2 attaches to the EP-CAM epitope on ovarian cancer cells, it will stimulate NK cell migration toward the cancer cells, and bring about NK cell synapse formation with the cell, and eventual apoptosis. The goal of the project is to treat ovarian tumor cells, OVCAR-3 cells, with KS-IL2 and measure the cell signaling between them and the NK cells, and also watch the migration of NK cells toward the cancer.

## **MARGAY (*LEOPARDUS WIEDII*) MICROHABITAT USE OF CACAO AGROFOREST LANDSCAPE IN COSTA RICA**

Julianna Arntzen, and Christopher Vaughan (Mentor),  
Forest and Wildlife Ecology

During June 2007, microhabitat use of margays (*Leopardus wiedii*) within a cacao (*Theobroma cacao*) agroforest and surrounding agricultural areas near Pueblo Nuevo de Villa Franca (Limon Province, Costa Rica) was recorded. Two methodologies were employed: a) walking transects on the cacao farm and b) workers showing the researcher sites where margays were seen. Forty-one data points of observations between 2003 to 2007 were recorded; 61% were on the ground within cacao and 24% were resting in Cacao trees. Average distance from water was 77.29 m (s.d. 98.7), 75% of observations occurring within 0–100 m. We believe that the organic cacao farm is used as a corridor between the mountains and the riparian areas near the Diablo River. This paper is the first on the endangered margay cat in agricultural ecosystems.

## **FORMANDO LAZOS: IMMIGRANT LATINO/AS RAISING THEIR CHILDREN IN THE UNITED STATES**

Omar Arreola, and Lynet Uttal (Mentor),  
Human Development and Family Studies

When new immigrant Latino/a parents raise their children in the United States, they address differences between their Latin American culture and the U.S. culture. Our research identifies what Latino/a parents deemed important from their own culture to maintain and pass down to their children and what aspects of the U.S. culture they liked enough to adopt and instill in their children. The data for this analysis came from Formando Lazos, a research and parent/community education project in Madison, Wisconsin. This project provides facilitated dialogical workshops (called pláticas) for Latino immigrants in Dane County, Wisconsin, to meet and talk about their concerns about raising their children in the United States. The data was collected through the use of research slips, research pads, and audio recordings. A research team of students and Professor Uttal met to discuss the data collected and look for themes. Looking at the comprised information, we found major themes of what Latino/a parents both value from their own culture and what they like about U.S. culture.

### ***JOURNAL OF UNDERGRADUATE INTERNATIONAL STUDIES***

Amjad Asad, Asad Asad, Ann Babe, Emma Condon, Rashid Dar,  
Kyle Dropp, Daniel Knudsen, Adam Lichtenheld, Megan McGuire,  
Rachel Mehlhaff, Maria Putzer, Kris Ugarriza, Jeffrey Wright, and  
Scott Straus (Mentor), Political Science

The *Journal of Undergraduate International Studies* began as a proposal for the Leadership Trust Award in 2003 by L. David Coddon, a political science and international studies major. Since then, the journal has grown from a small black-and-white publication to a full-color journal that publishes the best photos and essays in international studies. Our student editorial board seeks to highlight cross-disciplinary approaches to the field, which expand our understanding of global interactions. Publications document a wide variety of socio-political issues ranging from conflict and diplomacy to health and the environment to trade and economics. Subsequently, the *Journal of Undergraduate International Studies* represents a unique and expansive publication opportunity for students.

## **CODING *NEW YORK TIMES* COVERAGE OF CIVIL RIGHTS PROTEST, 1930–56**

Amjad Asad, Ashley Brown, Steven Siegelbaum, and  
Matthew Nichter (Mentor), Sociology

The goal of this project is to build a database of African-American protest events that were reported in *The New York Times* from 1930–56. The project is intended to correct methodological shortcomings in prior efforts to code the same source, which found very little protest activity before 1955–56.

## **WAYS TO AVOID THE EVIL SIDE OF NEPOTISM**

Julie Auerbach, Alexandra Schulp, and  
Ann Kinkade (Mentor), General Business

This project explains how nepotism can have adverse effects on a family business; by negatively influencing family relationships that go beyond the business environment, as well as impacting the success of the business in its entirety. The project discusses the potential negative outcomes by looking at two different firsthand examples of family-run businesses. Conversely one might wonder, is nepotism always evil? After looking at the downfalls of nepotism, this research gives precautionary measures to avoid facing these dangerous issues. It is expected that by implementing these preventative measures, family businesses can actually leverage nepotism by embracing the positive aspects of including their family in their working environment.

## **STEREOTYPE THREAT AND WOMEN'S MATH PERFORMANCE: GENDER IDENTIFICATION AND LOCUS OF CONTROL BELIEFS**

Anthony Austin, and Patricia Devine (Mentor), Psychology

Previous research has found that women underperform on math tasks when they are reminded of societal stereotypes; a phenomenon referred to as stereotype threat. Individual differences in gender identification and locus of control beliefs have both been shown to moderate the effects of stereotype threat. The current study integrates previous research by examining how gender identification and locus of control beliefs interact to predict susceptibility to stereotype threat. This study allows us to better understand why certain women are particularly vulnerable to stereotype threat, and takes us one step closer to alleviating its detrimental effects.

## **HUNGRY MINDS FEEDING HUNGRY FAMILIES: THE WEXFORD RIDGE FOOD PANTRY PROJECT**

Christina Ave'Lallemant, Elisabeth Berkelman, Laura Dalrymple, Sara Eckerman, Jaclyn Hanson, Nicole Hilgendorf, Laura Maszak, Lindsey Nor, Roxana Peters, Ashley Rusch, Sam Southard, Megan Treacy, Jessica Young, Aaron Ziltener, and Yvette Egan (Mentor), Nursing

In the fall of 2007, students from the University of Wisconsin–Madison School of Nursing established a relationship with the Wexford Ridge Neighborhood Center and food pantry in a community-based service project. The purpose of the relationship was to influence the nutritional content and quantity of food that donators contribute to the pantry. Students created and distributed a list of the 25 most needed food and personal items to local donating organizations. The students also compiled a binder containing information on current donators, possible fundraising opportunities, and pantry rules and operations. As the food pantry transitions into a new building in the summer of 2008, the binder will exist as a reference for pantry staff and volunteers.

## **CEO COMPENSATION AND RISK TAKING: CEO PAY COMPARISONS, UNCERTAINTY, AND ACQUISITION BEHAVIOR**

Justin Balthazor, and Cynthia Devers (Mentor),  
Management and Human Resources

This research involves the gathering of pay-related information regarding Chief Executive Officers, building a model of what a CEO is expected to earn, and then analyzing the CEO's risk behavior, where risk is determined by the number of acquisitions made by the firm in the year. The expected risk behavior of the CEOs follows basic prospect theory in that we expect those CEOs who are either earning more than expected or who experienced a positive pay differential from last year will be risk averse, whereas those CEOs that are earning less than expected or have experienced negative pay differentials from last year will be risk seeking.

## **HUMAN IMPACTS ON SEA TURTLES IN WESTERN MEXICO: CONSERVATION IMPLICATIONS**

Mallory Barnes, Jackie Martin, Melanie Mossing, and Jim Berkelman  
(Mentor), Forest and Wildlife Ecology

Our project compares sea turtle conservation efforts in Western Mexico to conservation efforts in other regions. We visited Western Mexico with our Wildlife Ecology 375 course in January 2008 and researched literature on sea turtle conservation after our return. We examine the impact of human activities, including nest poaching, habitat destruction, and incidental takes, on sea turtle populations. We compare an array of genetic research done on sea turtles, specifically tracking breeding individuals and identifying genetic diversity within nesting sites. Other research methods are evaluated for their effectiveness in comparison to using genetic markers. Based on our research of international policies and regulations for protection of sea turtles, we propose new conservation strategies for sea turtles in Western Mexico.

## **RAPID ACTION OF ESTROGEN (E2) IN PRIMATE LUTEINIZING HORMONE RELEASING HORMONE (LHRH) NEURONS**

David Baumann, and Ei Terasawa (Mentor), Pediatrics

LHRH neurons control reproductive function. Rapid action of E2 on LHRH neurons was investigated. Previous research in our lab has shown that E2 application to primate LHRH neurons stimulated LHRH release within 10 minutes, suggesting a pathway that does not require genomic action. To test the possible action of estrogen, cultured LHRH neurons were exposed to E2 dendrimer conjugate, which has been shown to be effective in stimulating extranuclear activities but ineffective in stimulating nuclear-initiated gene expression. Results indicate that E2 dendrimer conjugate stimulated an LHRH increase; however, dendrimer control did not. Therefore, rapid E2 action on LHRH neurons occurs without estrogen's entry into the nucleus.

## **EMBRYONIC SIGNAL DIRECTED DIFFERENTIATION OF EP-CAM+ MOUSE ENDODERM PROGENITOR CELLS**

Jesse Bauwens, and Jon Odorico (Mentor), Surgery

Our lab has developed a method for purifying a population of definitive endoderm cells, which appear developmentally restricted and are significantly less tumorigenic than ES cells. From these sorted cells, a cell line, referred to as 230, has been derived that appears to consist of committed pancreatic precursor cells, which can grow indefinitely in culture. Here, we examined whether 230 cells are capable of being further differentiated into pancreatic endocrine cells, such as insulin-expressing beta cells by performing tissue explant co-culture experiments. Labeled 230 cells were injected into tissue explants comprised of either e13.5 embryonic pancreas, liver, or brain using a microinjection pipette. The injected rudiments were subsequently fixed, sectioned and stained after 0,1,2, and 3 days of in vitro culture. Immunohistochemistry revealed that, within the pancreatic rudiments, the injected cells began to independently produce insulin and glucagon, but these cells failed to express these hormones after injection of cells subcutaneously in live immunodeficient mice. This finding suggests that embryonic signals emanating from the pancreatic rudiments directed the differentiation of 230 cells into endocrine cells. The results achieved by this experiment might suggest that the 230 cell line could be useful for generating pancreatic cell types. This could be of tremendous importance to the field of stem cell biology aimed at generating functional insulin producing beta cells for transplantation into patients with diabetes. Future experiments include improving culture conditions to increase tissue viability, repeating the experiment with different cell lines, and developing a more efficient injection protocol.

## **TARGETING OF L-TYPE CA<sup>2+</sup> CHANNELS IN HEART CELLS: IMPLICATIONS FOR HEART FAILURE AND ARRHYTHMIAS**

Daniel Beardmore, and Ravi Balijepalli (Mentor), Medicine

Dysregulation of Ca<sup>2+</sup> inflow through L-Type Ca<sup>2+</sup> (Cav1.2) channels can lead to heart failure or arrhythmias. A subpopulation of Cav1.2 channels localize to specialized membrane microdomains resembling caves called caveolae, where they associate with caveolin-3 (Cav-3). Mutations in Cav-3 and Cav1.2 genes have been implicated in causing heart disease. The Cav1.2 channel complex includes the alpha subunit, which forms the pore in the membrane for Ca<sup>2+</sup> passage, and the beta subunit, which targets the alpha subunit to the membrane. We hypothesize that specific beta isoforms are responsible for caveolar membrane targeting of the alpha-1c subunit.

To investigate this, genes for alpha-1c, beta isoforms, and Cav-3 or Cav-3 mutants will be expressed in HEK cells, then assayed for protein localization by immunostaining. Understanding the composition and localization of L-type Ca<sup>2+</sup> channels will provide insight into channel function in normal and disease states.

## **PATERNAL BEHAVIOR INFLUENCES OFFSPRING ACROSS MULTIPLE GENERATIONS IN MALE CALIFORNIA MOUSE**

Natalya Libo, and Catherine Marler (Mentor), Psychology

California mice (*Peromyscus californicus*) are a species in which paternal care has a large behavioral and neuroendocrinal effect on offspring. Previous studies show that adult arginine vasopressin (AVP) and testosterone (T) levels in offspring can be significantly influenced by pup retrieval by the father during development. I studied whether these effects are transferred through multiple generations. I hypothesized that F1 generation pups that are retrieved more often by their fathers retrieve their own F2 generation pups more often, therefore the F2 generation would show an increase in T levels and AVP staining. I manipulated paternal behavior and compared the behaviors of the F1 and F2 generations. This experiment adds to the understanding of paternal behavior on offspring brain and behavior and perhaps similar mechanisms are present in humans.

## **GENETIC ANALYSIS OF SECA1 AND SECA2 FUNCTION IN *ARABIDOPSIS THALIANA***

John Beirne, and Donna Fernandez (Mentor), Botany

The Sec-dependent pathway is responsible for protein transport across or into plant thylakoid membranes. It is homologous to the bacterial general secretion pathway and consists of a membrane-bound SecYE channel and SecA ATPase that facilitates translocation. Two versions of this pathway have been identified in plants: the well characterized SecA1/SecY1 pair, and the less understood SecA2/SecY2 pair. We have discovered that SecA1 mutants are pale colored and seedling lethal, as are SecY1 mutants; while SecA2 mutants are embryo lethal, as are SecY2 mutants. We identified SecA2 coding sequence through transcript analysis, and transformed SecA rescue constructs into plants using *Agrobacterium tumefaciens*. Analysis of the mutants suggests that each SecA interacts solely with their corresponding SecY partner, but further experiments are needed to prove this.

## **PRIOR EXPERIENCE AND THE EMERGENCE OF MARKET LOGICS IN THE U.S. WHOLESALE ELECTRIC POWER MARKET**

Jeremy Berg, and Phil Kim (Mentor), Management and Human Resources

Markets are largely recognized as one of the most important institutions in the capitalistic society. Little research has been invested, until recently however, in the market formation process. This study aims to make contributions to knowledge in this field. We hoped to determine how market logics, organizing principles that provide guidance for action among buyers and sellers, form in developing markets and what role prior experience plays in this development. We studied power marketing firms registered between 1989 and 1998 and found that prior experience has a large impact on how firms view the market and how they choose to participate in it. Firms with prior experience in competitive markets suggest different models than those with experience in the electric power industry. Our findings make contributions to the understanding of developing markets.

## **THE EFFECTS OF THE KCNA GENE ON DIABETES IN MICE**

Bettina Billings, and Guo Zhang (Mentor), Physiology

To determine the effects of the KCNA gene on diabetes, lab mice are mated to obtain wild type and knockout mice. The mice undergo glucose tolerance tests, weekly body weighing and consume regular or high fat diets. By performing these tests the effects of the KCNA gene can be monitored to manipulate the physical state of the mice. The mice are determined to be stricken or susceptible to diabetes or healthy and free of the disease. The mice are monitored and then sacrificed after all data has been collected.

## **THE GALACTIC “RAIN”: HIGH-VELOCITY CLOUDS AROUND THE MILKY WAY**

Lori Bills, Pam Legare, and Suzanne Scott (Mentor), Design Studies

High-velocity clouds (HVCs) are parcels of gas that exist around the Milky Way Galaxy. Since their discovery in 1963, the origin of these objects has been a subject of debate. The on-going survey with the most powerful radio telescope in the world, the Arecibo telescope, is providing high-resolution data perfectly suited to study HVCs in great detail. This project investigates the newly discovered population of HVCs close to the Milky Way disk.

We have created a catalog of these objects with well-determined physical properties. We derive the cloud mass spectrum to test the hypothesis that the HVCs represent fragments of buoyant gas flows from the Milky Way disk.

## **CONVERSION OF BIOMASS TO 5-HYDROXYMETHYLFURFURAL AND RELATED COMPOUNDS**

Jacqueline Blank, and Joseph B. Binder (Mentor), Chemistry

The conversion of many different carbohydrates to 5-hydroxymethylfurfural (HMF) and related compounds is a process that has many applications in green chemistry. HMF, which can be derived from starch, is an intermediate that can lead to renewable fuels and chemicals. Glucuronic acid, another carbohydrate, can be converted to 5-formyl-2-furancarboxylic acid. In addition, xylan can be converted to furfural. HMF can be converted to dimethylfuran, which has advantages over ethanol as a renewable fuel. The products will be analyzed by high-performance liquid chromatography (HPLC) and mass spectrometry. It is expected that by varying the solvents, conditions, and processes, starch can be converted to HMF in respectable yields.

## **THE ROLE OF DOPAMINE IN THE REINFORCEMENT OF AGGRESSIVE BEHAVIOR IN *PEROMYSCUS CALIFORNICUS* MICE**

Ismail Boukahil, and Elizabeth Becker (Mentor), Psychology

Dopamine has been shown to play a role in aggression behavior. However, the underlying neural and hormonal mechanisms of dopamine's effect on aggressive behavior are not fully understood. In this study, we examine the role of dopamine in multiple aggressive-inducing experiences in the California mouse (*Peromyscus californicus*). While dopamine antagonists have been shown to decrease aggressive behavior, this is the first study to examine the role of dopamine on future winning ability. We hypothesize that blocking the effects of dopamine with a dopamine receptor antagonist will decrease a male's future ability to win an aggressive encounter. We will examine hormones such as testosterone as well as neural activation using immunocytochemistry.

## **STABILITY OF PALLADIUM NANOPARTICLES UNDER SIMULATED ENVIRONMENTAL CONDITIONS**

Ali Bramson, and Joel Pedersen (Mentor), Soil Science

Nanoscale palladium is commonly used as a catalyst and holds promise for many other applications. Environmental exposure to nanoscale palladium could have profound effects due to its reactivity. We investigated the stability of palladium nanoparticles (PdNPs) under simulated oxidative environmental conditions. We synthesized PdNPs via a modified aqueous reduction procedure and examined their stability using an in vitro biomimetic oxidative assay. Palladium nanoparticle transformation was characterized using a variety of analytical methods. Our results will be presented.

## **THE ROLE OF TACC PROTEINS IN MITOTIC SPINDLE ASSEMBLY**

Mitchell Brey, and Christiane Wiese (Mentor), Biochemistry

TACC proteins, when mutated, have been implicated in certain types of breast cancer. However, the molecular basis of their role in cancer is only beginning to be unraveled. In this study, we used time-lapse fluorescence microscopy to follow the movement of fluorescently tagged TACC proteins in extracts made from the eggs of the South African clawed frog. We found that TACC proteins move with microtubules, which are important cellular structures essential for cell division. This suggests that TACC proteins might cause chromosome segregation defects and cancer by altering the structure or the function of the microtubules.

## **A COMPARATIVE ANALYSIS OF NATIONAL INITIATIVES AIMED AT DEVELOPING EMBRYONIC STEM CELL TECHNOLOGY**

Meaghan Brody, and Sanjay Jain (Mentor), Management and Human Resources

The application of stem cell research and technology can be used to cure serious medical conditions. Embryonic stem cell research; however, encounters many ethical and moral boundaries, while adult stem cell research can be delved into with no moral or ethical confines. Our project looks at how the countries of the United Kingdom, Singapore, and Australia compare and contrast in terms of their developments in stem cell technology as well the social and political factors that have affected those research initiatives over the past ten years. Information on each country is acquired through extensive data collecting and analyzing: accessing, downloading, reading, and filing newspaper/magazine articles related to the developments taking place in stem cell technology in each of the three countries.

## **WHAT DO FAMILY BUSINESSES DO IN TIMES OF CRISIS?**

Jamie Burak, Natasha Fritsch, Samantha Ziman, and  
Ann Kinkade (Mentor), General Business

Is your family business in danger? Do you want to continue the family business legacy? Family businesses are leaders of economic growth both nationally and internationally. In addition, statistics reveal that only thirty percent transfer to the second generation. Because of this, it is imperative to understand the three best practices that help sustain a family business throughout a lifetime: holding family meetings, setting up an independent board of directors, and conducting strategic planning. This collaborative research will analyze specific family businesses and the essential steps they have taken to rebound and/or enhance their company's performance. This information will benefit those who are interested in owning, joining or simply starting their own family business as well as those who are already involved.

## **THE ROLE OF PSTPIP1 IN Podosome FORMATION AND PAPA SYNDROME**

Nicholas Burton, and Anna Huttenlocher (Mentor), MMI and Pediatrics

Podosomes are cellular extensions that allow the directed movement of cells such as macrophages. They are comprised of an actin protein core, and their regulation is essential to maintaining proper cell function. Podosome formation is controlled partially through the regulation of actin polymerization and the phosphorylation of the Wiskott-Aldrich Syndrome protein (WASP). WASP phosphorylation is in turn mediated in part by the adaptor protein proline-serine-threonine phosphatase interacting protein 1 (PSTPIP1). Recently, mutations in PSTPIP1 have been shown to cause the auto inflammatory disease known as PAPA syndrome. Here we report on the mechanism behind this disease as well as novel findings on how PSTPIP1 regulates immune cell migration in a hope that this new knowledge can be used in future treatments of autoimmune disorders.

## **LOBBYING AND LAWMAKING IN THE WISCONSIN LEGISLATURE**

James Campbell, and David Canon (Mentor), Political Science

This collaborative research project will analyze data collected by the Wisconsin Accountability Board to determine the effect of early-stage lobbying by interest groups on the Wisconsin Legislature's legislative output. I will examine correlations between the amount of money spent on lobbying for or against a bill or topic and its final status, the comparative potency of

interest groups' spending, and the ability of interest groups to set the legislative agenda. I will present my results as quantitative models that display relationships, and state my conclusions in a paper that addresses the implications of the research.

## **EXPLORING THE ROLE OF *MEDICAGO TRUNCATULA* CASTOR IN LEGUME NODULATION AND ENDOMYCORRHIZATION**

Colby Cantu, and Muthusubramanian Venkateshwaran (Mentor), Agronomy

Symbiosis is a relationship between two organisms, where both the partners are benefited. Two major symbiotic interactions between plant and microbes are legume nodulation and endomycorrhization. Legume nodulation is a mutualistic interaction between rhizobial bacteria and legume plants, whereas endomycorrhization is a mutualistic interaction between fungi and plants. It is reported that *Lotus japonicus* CASTOR plays a crucial role in these symbiotic signaling pathways. A gene called MtCASTOR, an ortholog to LjCASTOR, has been recently identified. The current research focuses on studying its role in legume nodulation and endomycorrhization through a reverse genetic strategy such as RNAi based gene known-down method and its sub-cellular localization in *M. truncatula*.

## **WISCONSIN SMALL TELESCOPE ARRAY FOR RADIO WAVES (WSTAR): COMPARING INTERFEROMETRY TECHNIQUES**

Rogerio Fernando Cardoso, Aaron Heinen, Kristen Jones, Sean Kalafut, and Peter Timbie (Mentor), Physics

We are building three small radio telescopes, based on the designs of MIT's Haystack observatory, to develop and test new interferometric techniques. An interferometer is an array of telescopes that combines signals to generate a higher resolution image than a single dish. We will build and compare an 'adding' with a 'multiplying' interferometer. To date, we have erected the first two telescopes on the roof of Chamberlin Hall and are using the sun to analyze beam pattern. We are also constructing a new amplifier from a Cal Tech design, with the goal of reducing system noise. WSTAR will also be used to investigate and map neutral hydrogen (HI) in the galaxy, and serve as a model for larger arrays like the Square Kilometre Array (SKA).

## **INTEGRATING EDUCATIONAL STRATEGIES INTO PATIENT CARE: OBSERVATIONAL STUDY OF OUTPATIENT PHARMACISTS**

Phueng Cha, and Beth A Martin (Mentor), Pharmacy Practice

The Assess-Adapt-Evaluate (AAE) model is a counseling and problem-solving method applied when educating patients about their medications. To study this model, interactions between community pharmacists and patients receiving new prescriptions will be directly observed. Fall semester focused on observer training: developing observational skills via pharmacy visits, reviewing literature regarding observational research techniques and health-care education, and finalizing project tools.

This spring, direct observations of pharmacists will begin. Audiotapes and an observational tool will be used to record information. Pre-observations revealed the model being applied differently depending upon each pharmacist's preference; evaluating patients' understanding was least applied. By observing 'best practices,' we can propose educational interventions to improve communications and help pharmacists better assess and adapt to patients' medication needs and concerns.

## **THE NEXT QUEENSHIP? THE MESSAGE OF SUCCESSION TO THE THAI THRONE IN THE FILM 'THE LEGEND OF SURIYO'**

Chu Hao Chan, Hsin-Pei Liu, and Michael Cullinane (Mentor),  
Center for Southeast Asian Studies

This project asserts that through the film 'The Legend of Suriyothai,' current Thai Queen Sirikit promotes the parallels between herself and Queen Suriyothai of Ayutthaya Kingdom in 16th century Thailand. Recently, the health problems of the current ruler King Bhumibol Adulyadej have raised public concern about succession. By financially supporting the film, Queen Sirikit would like the public to think of her as a self-determined and courageous figure as Queen Suriyothai represents in the film, and even more, to see her in the role of future ruler. We analyze the film along with film reviews and history of Ayutthaya Kingdom, and hope to draw audience' attention to recent succession issues in Thailand.

## **AN ANALYSIS OF MARKETING AND PUBLIC RELATIONS STRATEGIES AND THEIR EFFECTS ON FAMILY BUSINESSES**

John Chao, Maksim Stayetski, Jeremy Zimmerman, and  
Ann Kinkade (Mentor), General Business

This project evaluates family business marketing and public relations strategies and their effects on public image. Through a comprehensive analysis of recently publicized cases such as U-Haul, Gucci, Mattel, and Playboy, our research will explain the specific actions and strategies used by these businesses and how they have contributed toward company successes or failures. As companies place high priority on both establishing and maintaining a positive public image, this research can be very valuable to family businesses as they learn from the outcomes of such past issues. This study will help companies establish effective marketing strategies to build a positive image as well as various public relations approaches to maintain that image in the unforeseen case of crisis, scandal, or other negative publicity.

## **A THIRD CONSCIOUSNESS: THE IMPACT OF CHINESE CULTURE ON CUBAN LITERATURE AND ART**

Elizabeth Chen, and Guillermina De Ferrari (Mentor), Spanish & Portuguese

Racial and cultural diversity in Cuba is generally perceived as either a dichotomy of black/African and white/European, or as the celebrated synthesis of the two. However, a third identity is often missing from this ultimately dichotomous picture. The Chinese community began to appear in Cuba in 1847 to assist with the demands of a rapidly developing sugar economy. As a result, Chinese coolies made their debut in the western hemisphere through Cuba and altered the cultural, racial, and social structure of the island. This study intends to explore the role that Chinese culture has played in the development of Cuban literature and art through a study of literary texts and works of arts produced in Cuba since the artistic avant gardes of the 20th century.

## **THE USE OF IMMANENT JUSTICE AND BELIEF IN A JUST WORLD PRINCIPLES IN POVERTY SITUATIONS**

Blenda Chiu, and Colleen Moore (Mentor), Psychology

While past research supports Piaget's claim of immanent justice reasoning in children, recent research finds this reasoning prevalent in adults. Drawing upon Lerner's belief in a just world theory and poverty stereotypes, the current study tested the effects of character socioeconomic status and knowledge

of past immoral behavior on morality ratings in four scenarios. Morality ratings were lower for poor characters than wealthy characters. Characters who committed misdeeds received lower morality ratings than characters with unknown past behavior. Interestingly, participants with a stronger belief in a just world ascribed greater morality to wealthy characters than poor, regardless of the characters' disclosed past behavior. These findings encourage future investigation of the fundamental attribution error, the self-serving bias, and societal stereotypes of the poor in morality evaluation.

## **CONSUMER HEALTH VOCABULARY**

Danielle Cianciolo, Kelsey Stein, and Catherine Arnott Smith (Mentor),  
School of Library and Information Studies

Patients often misunderstand the information their healthcare professionals are trying to relay to them. Professor Catherine Arnott Smith is part of an open source consumer health vocabulary-building collaboration ([www.consumerhealthvocab.org](http://www.consumerhealthvocab.org)) that has identified hundreds of consumer terms for health concepts. Professor Smith is interested in how laypeople name health concepts, and if their terminology differs from that of healthcare professionals. As student researchers, we sift through postings made on health-focused Web bulletin boards and separate Web slang (LOL, TTYL) from medical acronyms. With the help of this research, search engines which incorporate consumer health vocabularies will be able to find more relevant documents about health topics.

## **PARENTAL CONFLICT, DIVORCE, AND ADULT CHILD INTIMATE RELATIONSHIPS**

Anna Clauson, Jena Hopper, Miller Lauren, Sarah Tyree-Francis, and  
David Lambert (Mentor), Human Development and Family Studies

The impact of parental conflict and divorce on children is a widely studied topic. Recent research has focused on the relationship between parent conflict, divorce, and adult children's intimate relationships (Toomey & Nelson, 2001). The purpose of this study is to further examine how parental conflict and divorce influences the attitudes and behaviors of adult children in intimate relationships. Participants will include approximately 300 young adults (age 18–24). The Miller Social Intimacy Scale (Miller & Lefcourt, 1982) is used to assess adult children's intimate relationships, and the Conflict Tactics Scale (Strauss, 1979) is used to measure level of parental conflict. Data collection will be complete by March 31, 2008. We hypothesize that offspring from high conflict or divorced homes will have less secure and higher conflict intimate relationships.

## **DEVELOPMENT OF A PLASMID OVER-REPLICATION-BASED ANTIMICROBIAL SCREEN**

Brian Cole, and Filutowicz Marcin (Mentor), Microbiology

The potential for new antibiotics based on a plasmid over-replication strategy presents a promising mechanism for next-generation antimicrobials. Bacterial cells have a species-specific maximum tolerable copy number. Small molecules that disrupt the negative control of plasmid replication by repressor-like molecules may be isolated from chemical libraries by means of a plasmid over-replication screen. Biosensors were constructed and the Keck small molecule library was screened for compounds that increase plasmid copy number in bacterial cells by using a GFP reporter system.

## **BULA BOOKS: CULTURAL AWARENESS AND ACTION FOR CHILDREN**

Zoe Coleman, and Renee Alfano (Mentor), Student Organization Office

Bula Books was founded by a group of returning study abroad students who experienced firsthand the need for further literature resources for the children of Fiji. Bula Books is a service-learning project that sends children's books from Madison to the children of the Fijian Islands. Our presentation today of pictures and video will describe the children who received Bula books. This presentation is aimed at recruiting students and socially aware individuals who wish to become involved in this organization.

## **MIGRANT NORMS AND NETWORKS IN HO CHI MINH CITY'S INFORMAL ECONOMY**

Erin Collins, and Ian Coxhead (Mentor), Agricultural and Applied Economics

Migration is usually seen as a positive response to structural changes in a developing economy. Social ties are usually seen as productive assets. In this paper we explore a case in which neither of these statements are clearly true. Qualitative research that focuses on the individual and household scale of female migrants working in an informal market economy of Ho Chi Minh City suggests that migration and social networks can sometimes be more burden than benefit for the poor. Attention to the experience of this group of migrants exposes very different push and pull factors, gaps in services, and inequalities than that which is evident from more aggregated data sets.

## **SIMULATION STUDY REGARDING FORCES THAT CHANGE GENE FREQUENCIES**

Kelly Connell, Srdan Gajic, and Guilherme Rosa (Mentor), Animal Sciences

A computer code to simulate gene frequencies over generations will be developed using the programming language Matlab. The simulation will take into account stochastic processes and the four evolutionary forces: selection, mutation, drift, and migration. Ultimately, the fate of alleles in subdivided populations which exchange genetic material through migration will be simulated. The simulations will allow for the prediction of allelic variance generated by mutation or the release of transgenic animals or plants into the wild. In addition, the code will be used to evaluate the usefulness of marker-assisted selection strategies in livestock.

## **PERSONALITY, TEMPERAMENT AND COLLEGE STUDENTS' CHOICE OF LIVING ARRANGEMENTS**

Kathryn Connors, Mallory Huber, Sasha Williams, Amie Ziegel, and David Lambert (Mentor), Human Development and Family Studies

The influence of personality and temperament on various aspects of behavior has been widely studied. However, little is known about the influence of personality and temperament on where an individual chooses to live. The research question we are examining is whether or not personality and temperament is associated with college students' choice of living arrangement. Participants will include 20 males and 20 females from one of four living arrangement categories: dorms, efficiencies or one-bedroom apartments, multiple-bedroom apartments, and fraternities/sororities/co-ops. Personality will be measured using the Big Five Questionnaire (Costa & McCrae, 1995) and temperament will be assessed using the Adult Temperament Questionnaire (Rothbart et al., 2000). Data will be completed by March 31, 2008.

## **SCREENING AND CHARACTERIZATION OF CYTOKINESIS REGULATORS IN *C. ELEGANS***

Steven Cook, and Jayne Squirrel (Mentor), Molecular Biology

Cytokinesis, the division of one cell into two, is a process necessary for the viability, development, and reproduction of all organisms. In animal cells cytokinesis is initiated by the constriction of an equatorial band of actomyosin filaments. A better understanding of the regulation of equatorial constriction will advance our knowledge of cancer, a disease in which cell division is aberrant. In the embryo of the nematode worm *C. elegans* several proteins regulate cytokinesis. One kinase, LET-502 (LET-502), phosphorylates the myosin II light chain, thereby contributing to cytokinesis. A screen to elucidate other kinases that function redundantly with LET-502 to phosphorylate myosin II during cytokinesis identified such a kinase - Tag-59. I have applied a variety of microscopy techniques to characterize the role of this kinase in cytokinesis regulation.

## **VALIDATION OF MICROWAVE RADIOMETER MEASUREMENTS OF ATMOSPHERIC TEMPERATURE AND WATER VAPOR**

Jacob Cychosz, and Robert Knuteson (Mentor),  
Space Science and Engineering Center

A batch of 35 research grade radiosondes (weather balloons) were launched throughout the summer of 2007 at the University of Wisconsin Space Science and Engineering Center. This is also the location of a newly acquired microwave radiometer (MWR) that was sponsored by a National Science Foundation grant. A detailed comparison is made between the radiosondes and coincident MWR temperature and water vapor measurements in a vertical column up through the troposphere. This analysis will better characterize the MWR instrument performance. Results from this study will lead to improvements in measurements of temperature and water vapor, which is the primary greenhouse gas.

## **AN EXPLORATORY STUDY OF THE MATERNAL EXPERIENCE OF PERINATAL LOSS IN MULTIPLE BIRTH**

Jennifer Czarny, Melissa Mellum, and Kristin Lutz (Mentor), Nursing

In a study of family experiences in complex multiple birth (MB) headed by Professor Lutz, four out of 19 families experienced perinatal loss. Our objective was to look at the effects of losing one or more MB infants on mothers, identify common themes, and develop recommendations for health care providers to improve practice. Our method involved analyzing data gathered in the Lutz study from maternal interviews and comparing those data to literature surrounding this topic. Searching PubMed, we found 1,732 articles on perinatal loss, five of which fit our criteria (perinatal loss in MB). Consistent with the published literature, we found most mothers experienced a complex grieving process and received inadequate grief support from health care professionals. Further research on this topic is needed.

## **THE EFFECTS OF GENETICALLY MODIFIED AND CHEMICALLY ALTERED FOOD ON PHYSICAL ACTIVITY LEVELS IN MICE**

Lisa Daniels, and Warren Porter (Mentor), Zoology

Since the WWII era, humans have sought to modernize food production with the use of synthetic pesticides and fertilizers to increase crop production. More recently, much attention has been given to ubiquitous use of synthetically produced chemicals in food production because of the simultaneous increase in both disease states worldwide and the use of synthetic pesticides and fertilizers. The lab I work with seeks to determine the effects of genetically modified and chemically altered food on the nervous, endocrine, and immune systems. My research aims to determine if these foods have an effect on the physical activity of mice. Feeding the mice organic, genetically modified, or chemically altered food, and then measuring their spontaneous activity, quantified as wheel revolutions per day, will show if there is a correlation between type of food ingested and whether hyper- or hypo-activity levels are induced by food production systems. These findings will hopefully reveal more about the possible health and safety issues these foods have.

## **DESIGNING CENTERS OF EXPERTISE FOR ACADEMIC LEARNING THROUGH VIDEO GAMES**

Rashid Dar, and Ben Devane (Mentor), Curriculum and Instruction

The research team at the Games, Learning and Society (GLS) initiative located at the Academic Advanced Distributed Learning Co-Lab at UW–Madison examines how video games and game-based learning environments help children—especially those who are marginalized in school—learn. In particular, this research study uses the turn-based strategy game series Sid Meier’s Civilization. Right now, the project uses Civilization III and the Conquests and Play the World expansion packs (extensions that typically extend the ‘life’ of the game). Civilization III allows advanced users to modify game scenarios, and researchers here have built game scenarios that model periods and events in history. Children playing these scenarios build extensive fluencies with and complex models of history that mirror concepts taught normal history curriculum. The ongoing design-based research study uses mixed methods in analyzing the data collected including discourse analysis, grounded theory, problem-solving tasks, focus groups, single-subject interviews, and more traditional assessment methods like tests and surveys.

## **CIVWORLD: THE USES OF CIVILIZATION III IN EDUCATION AND CURRICULUM**

Peter Debbink, and Ben DeVane (Mentor), Curriculum & Instruction

This project is designed to develop successful ways of integrating interactive, immersive media into a classroom setting as a tool for learning. Using researcher-built scenarios for Sid Meier’s Civilization III, we showed children basic gameplay then allowed them to play the game several weeks. We observed how historical concepts were learned through different game scenarios designed to teach about different time periods and historical events. Methods for analysis include Discourse analysis, grounded theory, problem-solving tasks, focus groups, single-subject interviews, and more traditional assessment methods like pre-tests, post-tests and surveys. Initial results indicate that children retain, and more importantly, apply those concepts into school work better than they may have done before playing the game. We found that, with an appropriate guiding curriculum and community of practice, Civilization III is an extremely useful tool for learning and we hope to further the use of game-based learning environments in education.

## **THE EFFECTS OF LAND MANAGEMENT ON NATIVE AND INVASIVE SPECIES DENSITIES IN THE LAKESHORE PRESERVE**

Ariel DeBroux, and Stanley Dodson (Mentor), Zoology

Invasive plant species are a serious threat to ecosystems and biodiversity worldwide. Land use and disturbance are important factors in determining whether invasive species are able to establish. Conservation of biodiversity depends on effective land management practices. By sampling three distinct areas within the Lakeshore Preserve, I will investigate the effects of land use on native and invasive species densities. I expect the site with the most management (restoration work) to have the highest native plant densities, and the area with the least management (most human disturbance) to have the highest nonnative populations. This study will establish a baseline species inventory, serve as a measure of effectiveness of restoration work, and help establish a relationship between the level of management and invasibility of the land.

## **SCULPTURES REPRESENTING BLACK AFRICANS IN EARLY MODERN VENICE**

Maurice Demus, and Gail L. Geiger (Mentor), Art History

This research consists of examining the context of a suite of furniture by Andrea Brustolon (1662–1732) executed by 1710 for a Venetian patron, Pietro Venier. The suite consists of a table, approximately fourteen standing figures, and at least a dozen chairs all featuring black ebony Africans, some wearing chains. The purpose of the ensemble remains unclear and most discussion has been focused on the artistic style of these “Decorative Art” pieces. Understanding the historical context will be essential in this project. We shall examine how and why different artists portrayed black Africans in both pictorial and sculptural form. We shall also investigate the historical context of the black African presence in the earlier Renaissance and Baroque periods in order to clarify the condition of slavery in Europe before the dominant Atlantic slave trade.

## **DOES BIOMONITORING FOR METHYLMERCURY HAVE A LASTING EFFECT ON HUMAN EXPOSURE?**

Benjamin Dickey, and Lynda Knobloch (Mentor),  
Natural Resources-Environmental Toxicology

We are examining the effectiveness of a statewide methylmercury exposure assessment as an intervention to prevent ongoing consumption of mercury-contaminated fish. We are surveying the original cohort of 2,031 Wisconsin residents who participated in the 2004 Fish Consumption and Methylmercury Exposure study. A mailed questionnaire is being used to ask participants whether they remember their previous hair mercury result and whether they have changed their fish consumption habits since that time. A second hair sample is also being collected for analysis at the State Laboratory of Hygiene. The information gathered over the course of the study will help us to evaluate the effect of informing residents of their hair mercury levels. The study will also provide information on the effectiveness and visibility of our current commercial and sport fish consumption guidelines.

## **BIOCORE OUTREACH AMBASSADORS: REACHING OUT TO IMPROVE RURAL SCIENCE EDUCATION**

Kate Dielentheis, Katherine Gielissen, and Michelle Harris (Mentor),  
Biology Core Curriculum (Biocore)

The goal of the Biocore Outreach Ambassador program is to sustain and expand current efforts to improve science education in rural communities in the Madison area. As an extension of the Biology Core Curriculum, the Outreach Ambassadors were founded to promote scientific investigation and exploration in elementary, middle, and high school students. Outreach in the Wisconsin Heights and Deerfield School Districts has thus far included in-classroom tutorials and experimentation as well as three successful Science Nights. Rural districts like Wisconsin Heights and Deerfield have extremely limited funding for active, hands-on science instruction. For example, last year Wisconsin Heights faced a financial crisis that prevented it from providing additional resources to science education. With funding from the WIF fellowship, the Biocore Outreach Ambassador program continued and strengthened efforts already in progress in the Wisconsin Heights School District as well as expanded efforts to two additional rural communities.

## **CONVERSATIONS IN ADULTS WITH TRAUMATIC BRAIN INJURY**

SarahMaria Donohue, and Lyn Turkstra (Mentor), Communicative Disorders

The purpose of this research is to understand the conversation characteristics of individuals with traumatic brain injury (TBI). TBI typically is associated with damage to the frontal or temporal lobes of the brain, which are important for cognitive functions, language, and speech. As a result, individuals with TBI often have communication problems, particularly in unstructured contexts like social conversations. The goal of this study was to measure conversational communication using a task designed to elicit natural conversations. The research involves video recording and analyzing conversations between a person with TBI and a non-injured subject of the same age and gender. By mimicking everyday communication, the results may provide tangible and helpful information about how to reintegrate a person with TBI into his or her social and work community.

## **HOW INFANTS LEARN WORDS: THE ACQUISITION OF STRESS PATTERNS IN DISYLLABIC NONSENSE WORDS**

Diana Dovorany, and Jenny Saffran (Mentor), Psychology

The process of language acquisition is dependent upon a word's meaning, use in sentences, and sound. Although much research has been conducted on how meaning and sentence use influence word acquisition, little has focused on the influence of phonological cues such as stress patterns. By nine months, infants have already learned the most common stress pattern of English speech, the strong-weak trochaic stress of disyllabic words (e.g., BĀ-bee). The goal of this study is to determine whether or not infants learn labels that have typical English stress patterns (trochaic, strong-weak stress) easier than labels that do not have typical English stress patterns (iambic, weak-strong stress), by teaching them novel labels for novel objects. This experiment will help us to understand how infants learn object labels, and if object labels are more readily learned when they reflect common stress patterns of English nouns.

## **INVESTIGATING THE CELLULAR ROLE OF THE YJGF PROTEIN BY ANALYSIS OF SUPPRESSOR MUTATIONS**

Deanna Downs, and Diana Downs (Mentor), Bacteriology

The YjgF family of proteins is highly conserved throughout the three domains of life, but no biochemical function has been described for these proteins. Past research in the Downs lab has uncovered phenotypes for strains of *Salmonella enterica* lacking YjgF that include defects in isoleucine biosynthesis under certain growth conditions. This study seeks to probe these metabolic defects through analysis of spontaneous mutations that can allow the cell to grow in the absence of isoleucine. Mutations have been mapped by generating a transposon insertion adjacent to the mutation and using sequencing to determine its chromosomal region. Characterization of suppressor mutations in this manner contributes to the development of a working model for YjgF's role in cellular metabolism.

## **EFFECTS OF IRON DEFICIENCY ON RENAL DEVELOPMENT IN EARLY LIFE**

Keri Drake, Molly Sauerbry, and Pamela Kling (Mentor), Pediatrics

Fetal iron deficiency disrupts renal development and decreases nephron numbers, a condition linked to hypertension. Because nephrogenesis occurs postnatally in rats, we modeled the impact of iron on renal development in rats. We studied dam fed (DF) controls, iron-deficient newborn rats (IDA), fed iron-deficient formula from P4-P12, and IDA plus 6 mg/kg/d iron (IDA+Fe). Glomerular density and surface area were calculated from H&E stained kidney sections. Average nephron density was reduced in IDA,  $P < 0.0001$  and intermediate in IDA,  $P = 0.002$ , compared to DF. Planar glomerular surface area was decreased in IDA rats compared to DF,  $P < 0.0001$ , with IDA+Fe trending intermediate. Glomerular volumes were lower in IDA+Fe,  $p < 0.01$ . IDA rats exhibit a 20% reduction in nephron density and glomerular area. Results support a critical role for iron in nephrogenesis and need for future studies.

## **THE EFFECT OF ESSENTIAL GENE KNOCKOUTS ON CHEMOTAXIS AND DECISION MAKING IN E. COLI.**

Michael Dreis, and Julius Adler (Mentor), Biochemistry

Chemotaxis, movement of microorganisms along a chemical gradient, will be used as a simple model to study the genetics of decision making. The purpose of this study is to determine the effect of essential gene knockouts

on chemotaxis in the bacteria *Escherichia coli*. Essential genes are required for growth on rich medium. Genetically altered *E. coli* that can survive when an essential gene is repressed will be used to test for an irregular chemotactic response to the repellent sodium benzoate. We hypothesize that essential genes may have an effect on chemotaxis and therefore decision making in *E. coli*. If an essential gene is found to affect chemotaxis, further research will be done to determine the mechanism of action.

## **CAN MICRO FINANCE HELP THE ENVIRONMENT WHILE IMPACTING LIVES AND PRESERVING CULTURE?**

Angela Dunz, and Jim Berkelman (Mentor), Forest and Wildlife Ecology

Economics could be the key to saving and restoring the environment in marginalized and indigenous communities. Non-sustainable farming and hunting will continue to accelerate if alternatives are not available. Micro loans and grants in amounts as small as fifty dollars have caught on quickly and are being applied all over the globe in rural and urban communities. Micro finance has been very successful and is impacting lives and communities in profound ways. My project explores how these loans in turn affect the environment. I also look at characteristics that make the loans successful. Finally, I ask the important question: as marginalized populations move closer to a market economy, are cultural values incorporated in these plans or lost?

## **PROJECT PLAYROOMS: KEY TO INCREASING DEVELOPMENT**

Anh Duong, Huyen Hoang, Nghia Le, Hoai Nguyen, and Judith Ladinsky  
(Mentor), Population Health Sciences

Vietnam Health Project (VHP), in collaboration with Dr. Judith Ladinsky, is dedicated to improving the conditions (e.g. lack of children's toys) of the Children's Hospital's rehabilitation room and playroom in Hanoi and Ho Chi Minh City, Vietnam. Four VHP members traveled to Vietnam to help provide physical therapy equipment and developmental sensory toys specialized for handicapped children. Furthermore, through VHP's efforts, the Children's Hospital will be more able to accommodate families with handicapped children. Families can trust that the services and resources furnished by VHP will increase the development and maturity of young patients. As students of VHP at this University, we have the opportunity to provide assistance to a community that is in dire need of help.

## **VAV-CRE TRANSGENIC MICE: MAPPING THE CRE INSERT GENE TO CHROMOSOME 12**

Mitchell Dyer, and Christopher Bradfield (Mentor), Oncology

The Cre recombinase-loxP system causes inactivation or deletion of a particular gene in a spatial or temporal manner. Cre recombinase recognizes loxP sites flanking DNA, causing recombination between the sites, deleting or inverting the DNA segment. The deletion of the Aryl hydrocarbon receptor (Ahr) in hematopoietic cells was achieved using Cre transgenic mice under the control of vav regulatory elements (vav-Cre). Cre transgenic mice were mated with mice possessing the Ahr allele flanked by loxP sequences in order to generate mice without Ahr gene function. Observed progeny genotype frequencies deviated from expected Mendelian ratios, indicating linkage between the Cre and Ahr alleles. Recombination frequency analysis showed the Cre gene at 5.66 cM from the Ahr locus on chromosome 12 in vav-Cre transgenic mice.

## **ETHICAL DILEMMAS IN FAMILY BUSINESSES**

Ari Eisenstat, Michael Rogers, Eric Sitman, and  
Ann Kinkade (Mentor), General Business

In almost every industry, family businesses comprise a majority of the market. However, in a system where ownership and management is so intertwined, ethics may become an issue when the company's well being is at stake. In the era of highly publicized ethical scandals, family business moral practices should be valued as a topic of utmost importance to the company. This study investigates the topic of corruption in high-level management and ownership and the reasons behind these ethical dilemmas. We will use case studies, such as the current DHB Industries scandal, to examine the ways top business executives fraudulently exploit the financial health of the company and launder it for personal interest. Although enforcement of these violations has increased, the theme of the family taking advantage of company privileges in a matter that destroys the enterprise continues to put a damper on the shining example family businesses as a whole pose for the benefit of our economy.

## **EFFECT OF RECREATIONAL TRAILS ON SONGBIRD BREEDING SUCCESS IN WISCONSIN FORESTS**

Elizabeth Elsmo, and Volker Radeloff (Mentor), Forest and Wildlife Ecology

The balance between providing natural areas for human recreation while maintaining viable habitat for wildlife species is a key factor in developing and managing natural areas. The number of people participating in outdoor recreational activities is expected to increase, and along with this, the impacts that human recreational activities have on natural environments and ecosystems. For this reason, research is necessary to determine the effects of non-consumptive recreation in natural areas so that these areas can be planned and managed accordingly to maximize conservation efforts. We propose to study the effects of recreational trails on breeding bird communities in the Baraboo Hills of Wisconsin. We will analyze breeding success of forest birds in four different categories: areas without multi-use trails, areas with infrequently used trails, areas with heavily used trails and areas with trails and experimentally created disturbance.

## **DISCUSSIONS ON ADVANCING REGENERATIVE THERAPIES (DART)**

Adam Ericson, and Renee Alfano (Mentor), Student Organization Office

DART is an expansive student-founded initiative focusing on next generation medical therapies: specifically stem cell, gene, and tissue engineering therapy. We will be showcasing BioPrinting (using ink jet printers to print tissues and organs) and human embryonic stem cells, with hands on activities. The DART platform is straightforward. Our various initiatives are complemented by a faculty-led seminar series emphasizing regenerative medicine and geared toward undergraduate students. DART integrates seamlessly with the already developing foundation of UW as a progressive community, and encompasses four primary goals: a) education/outreach, b) reaching the classroom, c) providing a constructive outlet for ambition, and d) developing international research perspectives. More information can be found at [www.DARTtalk.com](http://www.DARTtalk.com).

## **FORMANDO LAZOS: IMMIGRANT PARENTS AND CHILDREN OF IMMIGRANTS**

Estephany Escobar, and Lynet Uttal (Mentor),  
Human Development and Family Studies

In the past decade, the population of Latino families in the Midwest has increased. When Latino parents raise their children in the United States, they have to adjust to the differences between the values of their countries of origin and the ideas in U.S. society about how to raise children. Similarly, children being raised by immigrant parents in the United States have to weigh the values of two cultures. Our project focuses on the contrasting views of Latino immigrant parents when raising U.S.-born children with those of the children's perspective of being raised by immigrant parents. My research analyzed the data from two workshops, the first one on the topic of 'Immigrant Parents Raising Americanized Children' and the subsequent workshop that hosted a panel of adult children talking about their experiences of being raised by immigrant parents. This analysis is part of Professor Lynet Uttal's project, Formando Lazos. Formando Lazos is a research and parent/community education project that hosts monthly workshops for Latino immigrant parents in Madison, Wisconsin. This analysis used an ethnographic method of data collection and interpretation that explores the lived experiences and meanings that people give to their lives. We analyzed the audio recordings and written research slips and pads. Overall, we developed a better understanding of the bicultural experiences of both Latino immigrant parents and children.

## **THE U.S.-MEXICO BORDER AS A MICROCOSM FOR ENVIRONMENTAL JUSTICE ISSUES**

Maxwell Eva, Kristen Roewer, Victoria Vasys, and Andrea-Teresa Arenas  
(Mentor), Chicana/o Latina/o Studies Program

The environmental justice movement emerged to create awareness of environmental concerns unfairly experienced by various racial, economic and social groups. This project involves the firsthand investigation of such injustices along the United States-Mexico border as well as similar issues within the Madison community. By touring toxic sites and interviewing both members and activists in the Matamoros-Brownsville area, we were able to observe the quality of life on both sides of the border and to fully realize that the community is unethically affected by pollution and additional exposure to harmful substances. We are currently in the process of translating our newfound knowledge and passion to the Madison community by recognizing local environmental inequalities and working toward solutions to solve such injustices in our own community.

## **CREATING A WEB SITE FOR THE WILDLIFE ECOLOGY 375 MEXICO COURSE**

Mandy Feavel, Lili Prah, and Jim Berkelman (Mentor),  
Forest and Wildlife Ecology

Our Wildlife Ecology 375 class made a 14-day visit to western Mexico in January 2008 and learned about conservation efforts in the region. We visited universities, small communities, Las Joyas research station in the Sierra de Manantlan Biosphere Reserve, and various different ecosystems. We created a web site to provide information about this course to UW students and faculty, Mexican collaborators, or anyone else who may be interested in our work or in taking the course. We organized the web site by having a menu on the left to break down each topic. Within these topics there are photos, summaries of lectures and activities, description of techniques used and conservation issues studied.

## **THE DEPICTION OF OFF-RESERVATION INDIAN COMMUNITY LIFE IN WOOD COUNTY IN THE EARLY TWENTIETH CENTURY**

Kaylene Fiala, William Marquardt, and Larry Nesper (Mentor),  
Anthropology/American Indian Studies

We are studying the depiction of Indian people who were residents of the early twentieth-century off-reservation community of Skunk Hill in Wood County as they appear in local newspapers, censuses, archival records of letters, diaries, and photographs, and other historical record-keeping devices. We are concentrating on the period between 1900 and 1915 as we think the community was at its height during this time. So far, the newspapers have been quite informational, government records have highlighted biased viewpoints of the government, and other sources have shown a more intimate portrait of life. Ultimately, our information will be compiled so that Professor Nesper can write a book or scholarly article about the importance of multi-tribal off-reservation Indian communities in Wisconsin.

## **GLYCOSAMINOGLYCAN-POLYURETHANE COPOLYMERS AS BIOMIMETIC VASCULAR MATERIALS**

Claire Flanagan, and Kristyn Masters (Mentor), Biomedical Engineering

Novel biomaterials are crucial for the development of devices that replace or augment vascular functions by behaving anti-thrombogenically and non-immunogenically. Properties including viscoelasticity and hemocompatibility can be optimized using novel combinations of known biologically-applicable compounds. Specifically, extracellular matrix-derived glycosaminoglycans (GAGs), including hyaluronic acid (HA) and heparin, have been incorporated into polymers for development of clinically-relevant biomaterials. By adjusting GAG concentrations, a range of novel materials were tested for hemocompatibility using several assays that quantified protein adsorption, platelet adhesion, and the body's immune response. Furthermore, material properties were tailored and tested by varying reaction conditions to optimally synthesize heparin and HA-based polymers. The findings showed that cells respond favorably to these materials and HA-based polymers are currently being tested *in vivo* for emerging aneurysm treatment technologies.

## **DEVELOPMENT AND TESTING OF A DEVICE INTENDED FOR EFFICIENT AND SAFE ANEURYSM TREATMENTS**

Claire Flanagan, Kevin Hart, and Kristyn Masters (Mentor),  
Biomedical Engineering

Aneurysms affect 3–5% of the U.S. population, and 40% of untreated ruptured aneurysms result in death. However, contemporary treatments, including surgical clipping and endovascular coiling, pose other health and safety risks. New materials technologies have directed recent developments for safer and less invasive aneurysm treatments, including our development and testing of a single shape memory coil contained in a biocompatible polymer shell. The coil provides structural support, while the shell promotes vessel wall growth to seal off the device from blood flow. Tensile strength tests to investigate the response to mechanical stresses, blood flow simulation to assess device leakage, and an *in vivo* surgical study to evaluate overall device performance have led us to believe that this device may represent an advancement in aneurysm treatment.

## **MOUNTAIN PINE BEETLE HOST PREFERENCE IN LODGEPOLE VS. WHITEBARK PINE**

Megan Fork, and Kenneth Raffa (Mentor)

Global climate change influences many natural processes, ranging from shifts in weather patterns to alterations in species distribution. Mountain pine beetle (*Dendroctonus ponderosae*) is an indigenous disturbance agent in the Rocky Mountain conifer ecosystem, whose range and consequent ecological impact relate strongly to local climatic conditions. This research investigated MPB's host preference for initial entry, given approximately equal availability of both lodgepole and whitebark pine trees, and was carried out utilizing a bioassay method involving live mountain pine beetles and bark-phloem discs removed from trees. Results indicate that no statistically significant difference exists between beetle entry or gallery length in whitebark and lodgepole pine discs, and that there is not a statistically significant relationship between beetle aggregation and pine species.

## **HOST-GUEST CHEMISTRY WITH CUCURBITURIL**

Dennis Fournogerakis, and Howard Zimmerman (Mentor), Chemistry

Cucurbituril has previously been shown to be excellent at forming host-guest complexes by including molecules into its cavity. However, due to its poor solubility in all organic solvents, either acidic solutions or charged guest molecules were previously used to overcome the solubility problem. This limited the type of guest molecules suitable for complexation. Ionic solutions were determined to be successful in solving the solubility problem of cucurbituril, while still allowing a broader selection of guest molecules. Further, complexes formed from these conditions exhibited solubility in DMSO which enabled a <sup>1</sup>H NMR to be obtained in a non-acidic solvent. Two different enone molecules successfully formed complexes with cucurbituril using the new conditions. The ultimate goal after this complexation is to observe photochemical behavior for a guest molecule which is different than its normal free state rearrangement.

## **TISSUE-ENGINEERING THE VOCAL FOLD EXTRACELLULAR MATRIX**

Ryan Fox, and Susan Thibeault (Mentor), Surgery

Current surgical and pharmaceutical interventions for treating vocal fold scarring are unsatisfactory. An enhanced understanding of the long-term biological and mechanical alterations of the vocal fold tissue with the addition of a hydrogel is necessary for developing an ideal tissue-engineering construct for vocal folds that would promote efficient wound repair. We will use real-time PCR and rheology to measure transcript expression of extracellular matrix constituents and the biomechanical properties of the vocal folds respectively in 20 rabbits that will undergo bilateral vocal fold biopsies and injection. After biopsy, Carbylanô-5GSX % will be immediately injected into one vocal fold and with saline injection in to the other. Rabbits will be sacrificed at six months post injection. Transcript level and rheological changes of will be measured and compared.

## **MAPPING KISSPEPTIN LEVELS WITH A MICRODIALYSIS METHOD IN THE MEDIAN EMINENCE IN RHESUS MACAQUES**

Jenny Gelden, and Ei Terasawa-Grilley (Mentor), Pediatrics

Kisspeptin, a protein found in the stalk median eminence, is thought to play a role in the pubertal increase in the release of LHRH. The purpose of this project is to map the distribution pattern of kisspeptin release into the stalk median eminence region using a microdialysis method. This method allows for the assessment of neurotransmitter release from conscious animals. Data was obtained using x-rays and hormone assay analysis. The results indicate that higher levels of kisspeptin were found in the lateral and ventral positions of the stalk median eminence.

## **FUNCTION OF FOXQ1 IN THE PROCESSES OF LEARNING AND MEMORY**

Carlos Gil del Alcazar, and Corinna Burger (Mentor), Neurology

Our goal is to understand the molecular mechanism of memory formation during aging. Knowledge about learning and memory can lead to drug design to treat learning and memory disorders, including those related to age, such as Alzheimer's disease. A list of candidate genes was identified in the lab to be differently expressed in a group of aged rats that was able to learn, when compared to aged learning impaired rats. The gene Foxq1 was found to be

down regulated in aged superior learners. We plan to over express Foxq1 in the hippocampi of rats using viral gene delivery. In addition we will also knock down Foxq1, by generating sequence-specific siRNAs. Behavioral and electro-physiological tests will be performed on recombinant animals to determine their functional phenotype.

## **AUDITORY PREFERENCE OF CHILDREN WITH AUTISM**

Lynn Gilbertson, and Robert Lutfi (Mentor), Communicative Disorders

Social communication remains a challenge for many children with autism, and the period between infancy and preschool is crucial for social language development. Tapping into the auditory strengths and preferences of children with autism could lead to an improved option for early language intervention as audition bears great significance in verbal language acquisition. The purpose of this study is to obtain an objective measure of the auditory preference of children with autism using a novel sound-play procedure. Children with and without autism between the ages of two and three years were recruited to play with a keypad which produced sounds categorized into four sound groups (aprosodic speech, prosodic speech, aprosodic machine sounds, and prosodic machine sounds). Preference was measured by tabulating the number of hits on each key in the four sound groups. Comparisons were made across and within the typically developing children and the children with autism.

## **EDUCATION IN POST-APARTHEID SOUTH AFRICA: GENDER AND RACE DISPARITIES AS A VIOLATION OF HUMAN RIGHTS**

Rebecca Gilsdorf, and Sharon Hutchinson (Mentor), African Studies

During apartheid the educational system in South Africa gave white students a higher quality education. Many say that the problems with education in South Africa are no longer related to race; they are rooted in economic disparity. This is true, but the vast percentage of people who are poor, are poor because they are black or colored. The townships established during apartheid still exist and as long as the government does nothing to raise these people out of poverty, they will continue living at the same economic level they lived at during apartheid. By not offering a fair education to students who are not white, a gross violation of human rights is occurring and furthering the oppression of the apartheid regime.

## **CAREER DEVELOPMENT ACTIVITIES FOR HIGH SCHOOL STUDENTS WITH DISABILITIES**

Abby Ginsburg, and Erik Carter (Mentor),  
Rehabilitation Psychology and Special Education

Project Summer is a research study focused on identifying the skills, experiences, supports, and connections that youth with disabilities need to transition successfully into adulthood. The current phase of the research project is exploring how schools, businesses, communities, and families in Wisconsin can partner together to connect youth to meaningful career development experiences. We will present research findings describing the career development programs and activities offered by 34 Wisconsin high schools, as well as the extent to which these activities are accessible to students with emotional/behavior disabilities or severe cognitive disabilities. This research provides important information about the transition opportunities available to youth with disabilities and serves as a call to increase the inclusion of these students in school-to-work experiences.

## **THE ROLE OF CONNECTEDNESS AND AGENCY IN PROMOTING POSITIVE OUTCOMES FOR MIDDLE SCHOOL YOUTH**

Katharine Golen, and Kimberly Howard (Mentor),  
Department of Counseling Psychology

The purpose of this research is to better understand the factors in predicting positive outcomes for middle school youth including academic success and wellness, as well as socioeconomic status in relationship to these factors. A survey will be given to middle school students with the hopes to involve at least 450 students. After the students complete a survey, the data will be evaluated based on influences of social factors including peer, teacher and family support, as well as personal agency (the goal setting and motivation driven by the individual). With the results, we intend to compare how social support and personal agency contribute to positive outcomes of middle school youth as well as if socioeconomic status affects these results.

## **CONNECTING FAMILIES AND THEIR BUSINESSES: FAMILY MEETINGS**

Erin Goodchild, and Ann Kinkade (Mentor), Business

This research will demonstrate the importance of family meetings and the processes of these within a family business. Family meetings are an integral part of family business success; it is a forum to gather the family together to hash out problems on an even playing field. During family meetings emotions often run high and people are vulnerable. The goal of these meetings is to allow people to come to decisions regarding important business, ownership and family matters that affect the business. Family meetings can reconnect people to the culture of the family business and members can voice opinions on ideas and changes they have for family business continuity. Research will be done interviewing family business owners, as well as analyzing information found in family business journals and books. Current research stresses the importance of these meetings and standard steps for each business to take during a family meeting.

## **NON-DESTRUCTIVE ESTIMATION OF NET PRIMARY PRODUCTIVITY FOR NINETEEN PRAIRIE SPECIES**

Anne Gottwald, and Marie Johnston (Mentor), Soil Science

Below-ground productivity is important to total plant growth and plant interaction with soil, thus it is necessary to quantify this component. The purpose of this study is to use destructive analysis of prairie species to develop relationships between biomass production and non-destructive measures. Nineteen prairie species were grown and measurements of stalk height, canopy size, indirect leaf area index (LAI), and specific leaf area were taken. Above- and belowground biomass was harvested at the end of the season, dried, separated into leaves, stems, and roots, and weighed. Relationships to be developed include root: shoot ratio and indirect LAI to aboveground biomass. These relationships, among others, will provide non-destructive means to estimate productivity of the species.

## **STRESS REGULATION IN INCARCERATED ADOLESCENTS**

Alexander Reed Graf, and Elizabeth (Birdie) Shirtcliff (Mentor), Psychology

Early experiences shape stress and sex hormone profiles, particularly the circadian change in hormone values across the day. Adolescents with oppositional or disruptive behavior disorders often have low stress hormones and blunted circadian rhythms, perhaps as a function habituation to repeated stressful experiences. The purpose of this research is to investigate stress and sex hormone regulation in adolescents who are currently undergoing psychological treatment at the Mendota Mental Health Institute. Stress regulation will be measured before and after behavioral intervention and will involve the collection of saliva at five different times throughout the day for each patient. At the end of the study, all saliva samples will be analyzed for hormone concentrations of cortisol, testosterone and dehydroepiandrosterone. We expect to observe stress hormone levels will normalize over time with the advent of behavioral intervention and removal from a high-stress environment.

## **PHONOLOGICAL AWARENESS IN PRESCHOOL CHILDREN WITH HEARING LOSS**

Alison Greuel, and Jenny Saffran (Mentor), Psychology

Hearing-impaired children have shown delays in phonological awareness, a skill that is highly correlated with early reading achievement. However, the measures typically used to test phonological awareness require explicit knowledge of phonological structure and can be used only with school-aged children. A more implicit measure of phonological awareness—the interaction between word learning and phonotactic probability—was used to test a younger population (preschool children); children learned words with either high- or low-frequency sound sequences, and were tested on their ability to learn these words. Two groups of preschoolers participated: those with mild-to-moderate hearing impairment, and those who are typically-developing. Results from this implicit measure of phonological awareness were used to determine whether preschool-aged children with hearing impairment have poorer phonological awareness than their typically-developing peers.

## **DRIVING WITH BRAIN TUMORS**

Sukhmani Grewal, and Deepak Khuntia (Mentor), Human Oncology

There are no universal driving restrictions for persons with brain tumors. For safety purposes, certain guidelines should be implemented for this patient population. However, each type of brain tumor and respective treatment varies significantly. By surveying all the oncologists and neurosurgeons across the country through an online survey and obtaining their professional opinions concerning driving restrictions, we will obtain the useful data on current physician biases. Based on the results of the survey, the responses will be translated into guidelines to compose a standard set of driving restrictions to further the safety of all drivers.

## **ECOLOGICAL AND ECONOMIC SUSTAINABILITY OF ECOTOURISM IN MEXICO**

Rachel Guy, Barbara Heindl, Paul Schilke, and  
Jim Berkelman (Mentor), Forest and Wildlife Ecology

In recent decades, ecotourism has become a touch button word to describe a way in which ecology and economics could be married. In developing countries like Mexico, ecotourism has the potential to boost poor local communities, while promoting conservation of economically valuable resources. In order to ascertain if ecotourism in Mexico would be ecologically and economically sustainable, we examine case studies in which ecotourism failed to conserve its target species or stimulate the local economy along with cases that were successful at meeting conservation and economic goals. By understanding these failures and successes, it is possible to formulate a plan to develop ecotourism within Mexico that has a high probability of economic success and maintains ecosystem integrity in the area.

## **FORMANDO LAZOS: EMPOWERMENT OF LATINO IMMIGRANTS THROUGH A COMMUNITY PROGRAM**

Alexis Guzman, and Lynet Uttal (Mentor),  
Human Development and Family Studies

Increasing numbers of Latino immigrants are establishing permanent residence in Madison, Wisconsin. Latino immigrants are initially unfamiliar with life in the United States, especially about the culture of parenting here. Formando Lazos, a research and parent/community education project in Madison, Wisconsin, provides a space for sharing concerns and discussion of strategies for adjusting to life in the United States. During the facilitated

dialogical workshops (called *pláticas*) Latino immigrants (mostly women) in Dane County, Wisconsin, gathered to talk about their concerns about raising their children in the United States. Using indepth interviews with planning team members who organized and delivered the *pláticas*, we explored how these workshops served as a catalyst for empowering Latinos by allowing them to come together, voice their opinions, and meet others who may be facing similar problems. The *plática* organizers observed that the confidence of individual participants and their ability to present their opinions increased.

## **EFFECTS OF A UTERINE RESTRICTION MODEL ON FETAL KIDNEY DEVELOPMENT IN SHEEP**

Jason Habeck, and Pamela Kling (Mentor), Pediatrics

Fetal influences may alter organ development, such as kidneys, causing hypertension as an adult. We hypothesized that uterine restriction will disturb kidney development in the sheep fetus. Before pregnancy, a unilateral horn of the uterus was tied off in sheep. The sheep were bred and fetus continued during pregnancy, delivered at 120 or 130 days gestation. Fetal and kidney weights were determined. Tissues were fixed and sections stained by H&E and Gomori trichrome. Histology was evaluated. Control and unilateral fetuses were appropriately sized for gestation. The kidney weight/kg fetal weight was lower in unilateral lambs,  $p < 0.0001$ . Histology showed disturbed nephron development and increased collagen staining. Kidney development was disturbed suggesting smaller kidneys and fibrosis in the unilateral model. More studies are planned.

## **MEXICAN AMERICAN DEMOCRATS IN TEXAS 1960–75**

Kathryn Hall, and Benjamin Marquez (Mentor), Political Science

During post–World War II, Texas’s revolutionized economy initiated a change in partisan identity. Between 1965 and 1970, Mexican Americans transitioned from being an agricultural workforce to a white-collar workforce. Texas industrialized and employment opportunities in urban areas increased. Because of the lack of agricultural work, Mexican Americans became more concentrated in cities. Archival research was conducted to provide evidence that supports these explanations. By developing population charts, linear trends were identified and analyzed to show connections to specific political trends. Because partisan association cannot be evaluated through the census data, the results are incomplete. However, by evaluating Democratic national convention documents, Spanish surnames could lead to the racial demographics that describe how and when Mexican Americans came into the political arena.

## **NANOCONCRETE: USING NANOPARTICLES TO IMPROVE THE DURABILITY OF CONCRETE**

Ian Hanson, and Jessica Sanfilippo (Mentor), Materials Science Program

Concrete has a wide variety of applications and must be able to withstand the conditions in which it is used. Moisture poses a threat to the stability of concrete by promoting alkali-silica reactions between the concrete and its surroundings. This project seeks to limit the detrimental effects of these reactions using aggregate coating techniques. The coating process uses a silicon dioxide solution to coat aggregates with nanoparticles. The experiments showed that tensile strength and porosity were both improved after coating. This project next seeks to apply this coating technique into a manufacturing production train.

## **AT-1 IS AN ER MEMBRANE ACETYLCOA TRANSPORTER AND IS REQUIRED FOR THE ACETYLATION OF NASCENT BACE1**

Theresa Hare, and Luigi Puglielli (Mentor), Medicine

Alzheimer's disease, the most common form of dementia in the world, is characterized by abnormal accumulation of amyloid b-peptide (Ab) in the brain. Ab is generated by proteolytic cleavage of the amyloid precursor protein (APP) by the b-site APP cleaving enzyme 1 (BACE1). Our group has shown that both maturation and molecular stability of BACE1 require acetylation in the lumen of the endoplasmic reticulum (ER). The above acetylation machinery requires a membrane transporter that translocates acetylCoA (donor of the acetyl group) from the cytoplasm into the ER lumen. We hypothesize that AT-1 is the ER membrane acetylCoA transporter. My project uses various biochemical and molecular biological techniques to determine both the functional properties of AT-1 and its role in the metabolism of BACE1.

## **EARTH CENTER: FOR A UNIFIED ‘GREEN’ COMMUNITY**

Madeline Hartjes, Isabella Lau, and Travis Tennessen (Mentor), Geography

Madison is a city rich with community and campus involvement on many levels. Still, there exist many ongoing problems such as poverty, pollution, and illness. The environment is at the core of these issues and so is pertinent to everyone. We propose to build an environmental community center that would serve as a crossroads for ideas, inspirations, and possible solutions. Also, the center would promote environmental education and create stronger ties between nature and our everyday lives. Through the center we hope to nurture an environmental ethic while promoting cooperation and understanding between groups. We believe that this is needed in creating a healthy, balanced, sustainable community. Through this video we seek to communicate and mobilize our vision of building this “Earth Center” in Madison.

## **EXPLORING AN EASY WAY TO TEACH COMPUTER SCIENCE**

Daniel Hawk, and Andrea Arpaci-Dusseau (Mentor), Computer Science

The objective of this research is to construct a lesson plan that efficiently teaches principles of computer programming to adolescents and adults alike. Scratch, a program being developed by MIT, is used as a teaching tool. Scratch is a visual computer programming language editor. It incorporates puzzle-like pieces instead of text. Withdrawing focus from syntax complexity decreases frustration and improves learning comprehension drastically. Research is done to find commonly misunderstood aspects of Scratch by surveying a publicly available database of user-created Scratch programs. Lessons can then focus thoroughly upon these aspects. Testing and analysis is done for each lesson to gain feedback and allow for enhancing material order and explanations. This allows the development of the simplest and most encouragingly informative methods of explanation.

## **CHANGES TO NON-CONTACTED BASES HAVE A STRONG EFFECT ON COOA PROTEIN DNA-BINDING AFFINITY**

Nicole Helmke, and Gary Roberts (Mentor), Bacteriology

The CooA protein from the bacterium *Rhodospirillum rubrum* controls the transcription of genes for carbon monoxide metabolism. Like many DNA-binding regulatory proteins, CooA is a dimer that contacts two antiparallel ‘half-sites,’ with a short stretch of non-contacted DNA separating the two

sites. With these types of proteins, it is generally assumed that the non-contacted DNA has little or no effect on the strength of the interaction between the DNA and protein. This study found a significant effect on the binding affinity of CooA for different binding sites with changes in the non-contacted DNA region only. It was also noted that while symmetry is best for the portion of DNA contacted by the protein, it is not ideal in the non-contacted portion.

## **PREDICTORS AND PSYCHOLOGICAL PROFILE OF SITUATION-SPECIFIC DISORDERED EATING IN ADOLESCENT GIRLS**

Heather Hestekin, and Janet Hyde (Mentor), Psychology

This study examined a unique and as yet unstudied phenomenon, that of adolescent girls who avoid eating in the presence of boys (AEB). AEB girls (age 15) were compared to girls with anorexic symptoms, girls with a social phobia, and controls on a number of variables. Participants (N = 40) were from the longitudinal Wisconsin Study of Families and Work, selected based on their diagnosis from a semi-structured psychiatric interview and scores on a measure of disordered eating. Results showed that AEB girls had the same scores as girls with anorexia on measures of objectified body consciousness, body esteem, relational peer harassment, and depression. AEB girls differed from girls with social phobia on all measures. Further, differences between the groups did not exist two years before diagnosis (age 13). These findings shed light on an overlooked subset of adolescents who suffer from disordered eating.

## **THE MANY STREAMS OF THE MAGELLANIC STREAM**

Samantha Hoffman, and Snezana Stanimirovic (Mentor), Astronomy

The Magellanic Stream is a gaseous filament that trails behind the two of our closest galaxies, the Large and Small Magellanic Clouds. The Arecibo telescope, the largest radio telescope in the world, has obtained images of the “tip” of the Stream, with incredibly high resolution. For the first time, four distinct filaments or branches of the Stream are revealed. We compare spatial and velocity structure of the four streams with numerical simulations and find support for the tidal origin of the Magellanic Stream. We have also produced a catalog of 176 discrete, neutral hydrogen clouds in the Stream. A large fraction of clouds present in this region show complex velocity profiles, revealing the presence of both cool and warm neutral hydrogen gas.

## **THE ROLE OF MUC16'S TANDEM REGIONS IN MESOTHELIN BINDING AND SPREAD OF EPITHELIAL OVARIAN CANCER**

Sachi Horibata, and Manish Patankar (Mentor), Obstetrics and Gynecology

MUC16, a mucin, is proven to contribute to the spread of ovarian tumors through its interaction with mesothelin, a protein expressed by cells in the peritoneal cavity. However, the specific binding site on MUC16 is still unknown. The objective of this research was to determine which region of MUC16, 1R or 2R, serves as a ligand of mesothelin. To test its significance in mesothelin binding, two methods were used: cobalt column for purification of 1R or 2R and western blots for confirming its presence and binding with the antibodies (c-myc and VK8). The results show binding of 1R with c-myc, but not with the VK8, while 2R showed no binding to any antibodies. These results suggest that ovarian tumor binds with mesothelin when there is no VK8 present.

## **ETHNOMATHEMATICS: ENGAGING STUDENTS OF COLOR FOR ACADEMIC SUCCESS**

Fawn Houck, and Concetta Gomez (Mentor), Mathematics

'Ethnomathematics: engaging students of color for mathematical success' is a collaboration between the Wright Middle School, the UW-Madison Mathematics Department, and student researcher Fawn Houck, to engage middle school students of color in mathematics, and excite them in the subject so as to encourage their academic success. Together, the collaborators aim to address the scholastic racial achievement gap, by piloting an afterschool enrichment program of ethnomathematics. Over the 2007-08 academic year, Fawn Houck will research, develop, and lead age-appropriate mathematical activities drawing on actual practices of specific cultural groups, including cultures mirroring the demographics of the school, which is predominantly composed of students of color. Participating students will gain confidence and increased interest in math.

## **CIRCADIAN REGULATION OF MRNA BINDING PROTEINS**

Samuel Huang, and Cara Westmark (Mentor),  
Waisman Center for Developmental Disabilities

We are interested in determining if mRNA binding proteins fluctuate with the circadian cycle. mRNA binding proteins regulate downstream protein production, and their circadian regulation could explain differences in syn-

aptic plasticity throughout the day. In this study, we are investigating fragile X mental retardation protein (FMRP), an mRNA binding protein that is absent in Fragile X syndrome and is known to regulate the translation of many mRNAs. Loss of FMRP in fruit flies affects circadian behavior, but fluctuations in FMRP with the circadian cycle have not been previously analyzed in mice (Inoue et al., 2006). We will analyze mouse brain lysates prepared at six-hour intervals and assess FMRP levels with the circadian cycle. We expect FMRP and FMRP targets to fluctuate with the circadian cycle.

## **KINETICS STUDY ON PHASE TRANSFORMATION FROM TITANIA POLYMORPH BROOKITE TO RUTILE**

Jason Huberty, and Huifang Xu (Mentor), Geology and Geophysics

X-ray diffraction and Rietveld analysis were used to study the core-shell structure of magnetite ( $\text{Fe}_3\text{O}_4$ ) nano-crystals. Synthetic magnetite was produced by pyrolysis of metal fatty acids and formed monodispersed spherical nano-crystals with sizes of 10.3 and 34 nm. The 34 nm material exhibits a core-shell structure of wustite ( $\text{FeO}$ ) (20%) and magnetite (80%). The unit cell of the wustite is smaller,  $a=4.28 \approx$  than that for normal bulk wustite ( $4.32 \approx$ ) and the unit cell of the magnetite is larger,  $a=8.43 \approx$  than that for normal bulk magnetite ( $8.397 \approx$ ). The 10.3 nm material is composed of pure magnetite ( $a=8.3965 \approx$ ). Wustite has not been previously reported as an intermediate phase in magnetite synthesis. The presence of precursor metastable phases is important for the study of nano-structured materials with unique magnetic properties.

## **FLUID INCLUSION STUDY ON THE DIONNE QUARRY, MT. APATITE, MAINE: IMPLICATIONS FOR PEGMATITE FORMATION**

Jason Huberty, and Philip Brown (Mentor), Geology and Geophysics

Fluid inclusions were studied in a granitic pegmatite from Western Mt. Apatite, Auburn, Maine. Four types of inclusions were observed: type 1 inclusions are mixtures of  $\text{H}_2\text{O}$ ,  $\text{CO}_2$  and  $\text{CH}_4$  with 1–2 wt% NaClev.; type 2 inclusions are aqueous with 0–11 wt% NaClev.; type 3 inclusions are carbonic with 0.1–0.2%  $\text{CH}_4$ ; and type 4 inclusions are mixed  $\text{H}_2\text{O}-\text{CO}_2$  with unknown solids that nucleate upon freezing and remain stable to  $45^\circ\text{C}$ . Mt. Apatite has a distinctive red garnet seam that contains gahnite and pyrite. The homogenization temperatures for the garnet seam are  $300\text{--}360^\circ\text{C}$ , which is substantially higher than the  $200\text{--}240^\circ\text{C}$  measured for the outer zones. The higher temperature and presence of Fe, Zn, and Mn-phases suggest an additional fluid mixed into the pegmatite during its final stages of cooling.

## **DEVELOPING DEMOCRACIES IN THE IT REVOLUTION: INDIAN ICAFÈS AND CIVIL SOCIETY**

Muzammil Hussain, and Douglas McLeod (Mentor),  
Journalism and Mass Communication

By providing citizens with new means for information access and interaction, the rise of the virtual public sphere through the Internet has important implications for modern democracies. However, current scholarship on new media and politics is based mostly on the experiences of economically and technologically developed nations—not accounting for the myriad complexities and challenges faced by democracies in developing nations. Against the backdrop of concerns about the ‘digital divide’ (both between and within societies), this research explores the idea of ‘access’ more intricately, looking specifically at Internet cafès in India. By analyzing a unique combination of qualitative and quantitative data collected in metropolitan south India, this study attempts to further our understanding of the implications of the emerging virtual public sphere in developing democracies.

## **EFFECTS OF MENOPAUSE ON KISSPEPTIN EXPRESSING NEURONS IN THE MBH IN FEMALE RHESUS MACAQUES**

Erika Hutz, and Ei Terasawa (Mentor), Pediatrics

Kisspeptin (KP) is a neuropeptide that regulates the release of gonadotropin releasing hormone (GnRH) in the hypothalamus. This project is designed to study whether there is any change in KP expressing neurons in the medial basal hypothalamus (MBH) of menopausal and eugonadal female rhesus macaques. Brain tissues from two age groups were immunostained with the specific antibody, GQ2, against kisspeptin protein. Preliminary results show that a larger number of KP expressing neurons were found in the MBH of menopausal macaques than in eugonadal macaques. These results suggest that in the menopausal state, an increase in KP neurons due to the menopausal reduction in ovarian steroid hormones may be responsible for menopausal changes in GnRH release.

## **A FIRSTHAND LOOK AT NON-FAMILY CEOS IN FAMILY BUSINESSES**

Matthew Iodice, Andrew Jacobs, Jordan Schneider, and  
Ann Kinkade (Mentor), General Business

The primary purpose of this research is to analyze the specific relationships between non-family CEOs and family members working in a family-owned business. We hypothesize that the placement of a non-family employee at the top of a business hierarchy may inevitably create tension and strain on subordinate family members. The determination of our conclusions will be based on the firsthand experience of non-family presidents in our sample. Their personal interactions with family associates and potential hardships in communication developed are the main focus of our research. Our projected result is that although problems may arise between the collision of the business and family hierarchies, the overall working environment presented in a family-owned business is far superior to that of a publicly owned corporation.

## **ELECTRONIC PERTURBATION OF THE COPPER(II)-CATALYZED AMINOHYDROXYLATION OF ALKENES**

Ashley Jacobsen, and Tehshik Yoon (Mentor), Chemistry

The 1,2 amino alcohol is an important functional group in natural products and pharmacologically active structures. Our group has recently shown that copper(II) salts can catalyze the aminohydroxylation of alkenes with N-sulfonyl oxaziridines. In an effort to broaden the efficiency and utility of this reaction, we have investigated the effect of the N-sulfonyl protecting group of the oxaziridine. We have systematically explored the effect of various electron-donating and electron-withdrawing substituents and discovered that 2-Nitro sulfonyl oxaziridines afford a significant advantage in both the efficiency and practicality of our new methodology.

## **THE ORIENTATION OF G-TUBULIN IN MICROTUBULE NUCLEATION**

Jae Yeon Jang, Sarah Slauson, Christopher Zahm, and  
Christiane Wiese (Mentor), Biochemistry

The g-tubulin complex is an essential component in eukaryotes that assists in microtubule (MT) nucleation. In this complex, g-tubulin binds to other proteins in a specific arrangement. Currently there are two contradictory models of this arrangement: the template model and the protofilament model. The template model suggests that the g-tubulin complex binds MTs by forming a ring, capping the minus end. The protofilament model dissimilarly suggests that the g-tubulin complex forms a filament that extends laterally along the minus end of MTs. To test which model is correct, we are using site-directed mutagenesis to disrupt protein binding sites on different surfaces of g-tubulin. It is possible that one or more of these mutations will interfere with the formation of the g-tubulin ring complex suggesting one model over the other. This study will give us a better understanding of microtubule nucleation mechanism and the role of g-tubulin in eukaryotic cell.

## **EVALUATING COMPUTER PROGRAMMING LANGUAGES FOR CHILDREN**

Arizona Jaramillo, Tu Anh Vo, and  
Andrea Arpac-Dusseau (Mentor), Computer Sciences

Our project examines Alice and Scratch, two computer programming systems available for free online, to evaluate which one can better teach children and engage them in the field of computer science. In recent years, the number of computer science majors has significantly decreased. Therefore, the first goal of this project is to identify a programming language that is accessible, interesting, and educational for adolescents. Our preliminary results indicate that Alice, although accessible and engaging, does not necessarily teach children the fundamentals of programming. The second goal of this project is to create a template for after-school classes. We plan on helping to create lessons and exercises to lead students through Scratch so that they can program their own interactive games.

## **THE TRANSITION FROM THE COMBAT ZONE TO CAMPUS: A PRELIMINARY STUDY OF VETERANS IN THE CLASSROOM**

Carnes Jeff, and Cydney Alexis (Mentor), English

Veterans, especially those who have deployed overseas, face numerous difficulties transitioning from military to college life. This transition can occur over months or years; however, veterans can find themselves going from combat to a classroom in a few months. These difficulties often manifest themselves academically or socially. Even when there is strong support at a university for veterans, they still have special needs compared to traditional students, who enter college directly after high school. Instructors and administrators must be aware of the issues surrounding student-veterans in order to ensure that they achieve their academic goals. This study will explore how veterans at UW–Madison have transitioned into the classroom in order to give an on-the-ground look at the difficulties veterans face on a college campus.

## **EPIGENETIC MODIFICATION OF PAX6 GENES IN NEUROEPITHELIA INDUCTION FROM HUMAN EMBRYONIC STEM CELLS**

Stefanie Jones, and Su-Chun Zhang (Mentor), Anatomy

Epigenetic mechanisms play a unique role in maintaining stem cell pluripotency, yet how they affect early neural induction is unclear. Through activation and repression of certain genes, epigenetic modification has an important role in lineage differentiation. We investigated the role of these factors in the first step in the neural lineage: the formation of the neuroepithelia from human embryonic stem cells (hESCs). In particular, we examined the temporal change of histone modification of Pax6, the earliest gene expressed by neuroepithelial cells, during the neural induction process. Using Chromatin Immunoprecipitation (ChIP) assay, we found a significant difference in epigenetic modification of the P1 region of the Pax6 promoter. Understanding the role of epigenetic mechanisms in induction will facilitate future attempts to direct hESCs to specific fates.

## **ETHNIC IDENTITY NEGOTIATION: A STUDY OF ADULT TRANSRACIAL ADOPTEES FROM KOREA**

Hannah Jurowicz, and Joseph Elder (Mentor), Sociology

In America, transracial, or interracial, adoption refers to the joining of Caucasian parents and minority children in adoptive families. Since transracial adoptees' racial and ethnic heritage differs from that of their parents, the ways in which adoptees negotiate their sense of ethnic identity has been subject to ongoing controversy. However, past research has primarily focused on the impact of external factors on ethnic identity development (parenting, environment, discrimination) rather than how the adoptees have personally negotiated these factors. This study conducted interviews with male and female Korean adoptees between the ages of 19–28 who were adopted by Caucasian parents. The purpose of this study is to examine the ways in which adult transracial adoptees from Korea ethnically self-identify, what experiences they feel have influenced their identity, and how this identity ties to their sense of place in society. Gaining insight into this process may have important implications for counseling services, parenting techniques, and adoption legislation.

## **CHARACTERIZATION OF TAU PHOSPHORYLATION DURING THE DIFFERENTIATION OF HUMAN EMBRYONIC STEM CELLS**

Maria Kaltcheva, and Craig Atwood (Mentor),  
Geriatrics and Gerontology

Alzheimer's disease (AD) is the seventh leading cause of death in United States with an estimated annual cost of 100 billion dollars. The severity of this neurodegenerative disease is strongly correlated with the number of neurofibrillary tangles (NFT) composed of hyperphosphorylated tau, a microtubule associated protein. The phosphorylation of tau is known to be tightly regulated by glycogen synthase kinase-3 $\beta$  (GSK3 $\beta$ ) and cyclin-dependent kinase 5 (cdk5). These two kinases also play a vital role in neuronal cell development. We investigated the role of tau and its phosphorylation during early embryo development using human embryonic stem cells (hESC) as our model system. To accomplish this, we characterized the phosphorylation of tau and expression of tau, GSK3 $\beta$ , and cdk5 in undifferentiated hESC and neuroectodermal cells.

## **TOY OR SPADE: ASSESSING EFFECTIVENESS OF MEDIUMS FOR ENVIRONMENTAL EDUCATION IN MEXICO AND THE UNITED STATES**

Andrew Kellner, Samantha Nagy, and Jim Berkelman (Mentor),  
Forest and Wildlife Ecology

This study assesses multiple techniques for environmental education, which differ between countries due to social constraints and natural resource values. In Jalisco, Mexico, popular ways to teach the public about the environment include puppet shows and workshops in which children create toys from recycled materials. Commonly in the United States and emerging in Mexico, restoration ecology, the study of recuperating damaged and degraded ecosystems, is another medium for environmental education; material reuse is rare in the United States. Drawing on experiences with restoration ecology and leading a workshop making toys from recycled materials in the United States will allow for comparisons between these strategies and their effectiveness in these two countries. Successful environmental education programs can be established by identifying the best techniques for a given region.

## **EXAMINING RELATIONSHIPS BETWEEN MEASURES OF SPIRITUALITY AND PHYSICAL HEALTH**

Ashley Kemnitz, Rebecca West, and Diane Lauver (Mentor), Nursing

People identify multiple components of health: physical, mental, social, and spiritual. The aim of this secondary analysis was to examine the relationships between dimensions of spirituality and physical health. We used a descriptive correlational design with cross-sectional and longitudinal data. The sample was 90 graduate students at a Midwest university. Instruments used were: the Fetzer Institute Brief Measure of Religiosity/Spirituality subscales, a physical symptom checklist and a physical function scale. Correlations between spirituality and physical health revealed positive relationships. Spirituality and physical symptoms were inversely related. Five spirituality subscales were associated with less distress from physical symptoms. If nurses had reliable, valid and brief measures of spirituality, they could incorporate them into their research and practice.

## **EVALUATION OF AN ELECTRONIC AMMONIA-REMOVAL DEVICE TO REPLACE BIOFILTERS IN HOME AQUARIUMS**

Matthew King, and Terence Barry (Mentor), Animal Sciences

Ammonia is highly toxic to fish reared in closed systems (e.g., aquariums and recirculation aquaculture systems). The current solution to this problem, biofiltration, has numerous drawbacks. The objective was to test a novel electronic device that converts ammonia directly into nitrogen gas using a process called photoelectrocatalytic oxidation (PECO). Specifically, I evaluated the ammonia removal kinetics of three different-sized PECO devices (i.e., 9-, 18-, and 36-watt) in seawater and freshwater. Ten-gallon aquariums were filled with water and spiked with 5 mg/L ammonia-nitrogen. Water samples were collected at intervals (15 to 60 min) and analyzed for ammonia, nitrite, and nitrate using colorimetric assays. As hypothesized, larger PECO devices were more efficient at removing ammonia than smaller units. Ammonia removal was faster in seawater than freshwater.

## **REPEATED READING INTERVENTION**

Sami Kirzner, and Kimber Malmgren (Mentor),  
Rehabilitation Psychology and Special Education

Maintaining grade-appropriate reading abilities is an ongoing struggle for America's schools. Many teachers have their students read silently in the classroom. However, repeated reading interventions can provide today's youth with a more interactive approach to help increase their reading levels. Repeated reading interventions were performed by trained mentors on pre-approved students ages 6–10. First, students were monitored as they read a reading level-appropriate passage three times. Then, students would read the passage aloud for one minute, and a mentor would record the errors, words read, and would give positive feedback and corrections. We have found there to be an increase in reading speed at the end of each intervention session, leading to an overall increase in reading level by the end of the year. We expect our results to show that repeated reading interventions work much faster than silent reading. On a larger scale, if we help enable students to reach or surpass their appropriate reading level, we can greatly improve the quality of the education they receive. If significant results follow this study, repeated reading interventions will be implemented in surrounding schools and after-school programs within Wisconsin and beyond.

## **EPSTEIN-BARR VIRUS NA PROTEIN FUNCTION DURING LYTIC VIRAL REPLICATION**

Ariel Kleman, and Stacy Hagemeyer (Mentor), Oncology

Epstein-Barr Virus (EBV) is a human herpes virus associated with infectious mononucleosis and B cell related malignancies. EBV undergoes both latent and lytic stages of viral replication with varying viral gene expression. Expression of EBV immediate-early (IE) proteins initiate entry into the viral lytic cycle and are thought to be assisted by the Na protein. The goal of my project is to examine the regulatory function of the viral Na protein in regards to EBV lytic gene expression. Na expression vectors will be generated and used to examine the effects of Na on EBV promoter activity and lytic protein expression. Additionally, these vectors will be used to generate stable EBV positive cell lines overexpressing Na and further characterize Na function during EBV infection.

## **INCREASING HYBRIDITY VIA CONTROL OF THE GAMETOPHYTIC SELF-INCOMPATIBILITY SYSTEM IN RED CLOVER**

Jennifer Knack, Andrew Krohn, and Heathcliffe Riday (Mentor),  
U.S. Dairy Forage Research Center

Red clover (*Trifolium pratense*) is a valuable forage crop due to its high protein content and nitrogen-fixing capabilities. Capturing hybrid vigor in red clover could increase agronomic performance of cultivars. We hypothesize that manipulating the self-incompatibility system present in red clover will allow this. We believe we can increase pollination between two heterotic populations by restricting gametophytic self-incompatibility alleles within those populations. To test this concept we created backcross populations with restricted self-incompatibility allele sets. We cross-pollinated these back-cross populations with an unrelated population and measured how many progeny have both parents from the back-cross population (within) verses one parent from each population (hybrid). We determined the genotype of the parents and the progeny using PCR-based microsatellite analysis. Our hypothesis states that 75% of the seed-derived progeny from the back-cross population will hybridize with the unrelated population.

## **SLOW ACTIVATION OF HERG CHANNELS**

Robert Kneeland, and Gail Robertson (Mentor), Physiology

IKr is a repolarizing potassium current in mammalian cardiac myocytes required for normal cardiac function that is produced by ion channels encoded by the human ether-a-go-go related gene type 1 (hERG1). Inhibition of hERG1 channels results in Long QT syndrome type 2 (LQTS2), a potentially fatal condition leading to polymorphic ventricular arrhythmias and sudden death. hERG is a slowly activating channel with activation time constants of  $68.2 + 6.6$  ms and  $292 \pm 20.4$  ms (Trudeau, Warmke et al. 1995). Studies of this activation process have revealed an additional process that increases current amplitude on a much slower time scale. My studies aimed to characterize this process, a better understanding of which may facilitate therapeutic approaches to the treatment LQTS2.

## **PRIVATE MILITARY COMPANIES AND THEIR EFFECT ON INTERNATIONAL POLITICS**

Justin Knoll, and Kate McCoy (Mentor), Sociology

Private military companies (PMCs) are privately owned and armed groups whose international presence in war is growing at a tremendous rate. Because PMCs are required to adhere to a different set of international laws than governmental armed forces, many questions are raised on the future of international politics. Questions about how to regulate PMCs efficiently, or under what terms can PMCs hire employees remain largely unanswered. The purpose of our research is to compile as much information as possible concerning these private military groups and to put this information in a database. Because the phenomenon of PMCs is so young, this will to be the first database of its kind available to researchers and academics.

## **META-ANALYSIS STUDY ON CAREER EDUCATION AND ACADEMIC PERFORMANCE**

Zina Knox, and Kimberly Howard (Mentor), Counseling Psychology

This project will examine the relationship between involvement in career education activities and academic achievement. In this study we will collect and aggregate all empirical studies conducted since 1966 that have examined this relationship. This study replicates and expands a meta-analysis conducted in 1986 on the same topic. It is predicted that, as in 1986, we will find that career education activities serve to support the academic learning of students.

## **MATERNAL HEALTH CARE SEEKING IN MATHARE VALLEY**

Stephanie Koczela, and Claire Wendland (Mentor), Anthropology

I conducted formal interviews with a sample of recent mothers from Mathare Valley (Nairobi, Kenya) about their health care seeking behaviors during pregnancy and birth. These interviews revealed trends that suggest that unique strategies are needed for improving maternal health among the urban poor, as the factors that influence women's behavior are not those that policy makers have assumed. Women are primarily influenced by lack of funds and the lack of high-quality care available in the area's hospitals. Reputations of these hospitals as low quality and dangerous does not give women the necessary motivation to seek care there. Efforts to improve maternal health in urban slums will need to attend closely to the quality and cost of biomedical care, rather than women's proximity to care.

## **ADAPTATION OF DENGUE VIRUS TO MOUSE VISCERAL ORGANS**

Sarah Koeppen, and Jorge Osorio (Mentor), Pathobiological Sciences

Experiments show that Dengue fever, one of the most important subtropical diseases, is extremely neurovirulent in mice, but has difficulty infecting other tissues in mice. Dengue fever does not affect humans in the same way. The purpose of this project was to adapt a strain of DEN-2 virus to grow in the visceral organs of mice, thereby more closely matching the method of infection found in humans. Mice were infected with a dengue virus first adapted to human hepatoma cells. Organs were then harvested to analyze viral isolation and viral titers. We expect to find high viral titers, indicating the virus has successfully infected the visceral organ, thereby creating a more effective animal model. Such a model is critical to vaccine research and development.

## **IMPROVING FAMILY HEALTH THROUGH A PARTNERSHIP WITH YMCA'S KIDZFIT AND HARAMBEE HEALTH HOUR**

Robert Korom, and Linda Baumann (Mentor),  
School of Nursing, Center for Global Health

The partnership forged between YMCA's KidzFit, a fun fitness program for children, and Harambee Health Hour, a weekly bilingual exercise and health education program, was designed to improve family health in Madison's south side community. This Wisconsin Idea Fellowship project is a collaboration between Access Community Health Centers, the YMCA, UW faculty, and student volunteers. Our goals were to improve coordination of volunteers for an expanded program, launch a multifaceted publicity campaign, and evaluate participant fitness levels and their perceptions of the program throughout the year. Our evaluation of participant perceptions showed that while many participants attended with a goal of losing weight, the overwhelming majority attend consistently because of the relationships and community support we have collectively created at the Harambee Health Hour.

## **LISTENING STRATEGIES IN DYSARTHRIA: DIFFERENCES BETWEEN STRONG AND WEAK LISTENERS**

Amy Kramper, and Katherine Hustad (Mentor), Communicative Disorders

This research examined endorsement of cognitive, linguistic, segmental and suprasegmental listening strategies by listeners who transcribed dysarthric speech. In particular, this study addressed whether strategy endorsements differed between listeners with the highest and lowest intelligibility scores. Eighty listeners orthographically transcribed the speech of eight individuals with dysarthria secondary to cerebral palsy and rated their use of Klasner and Yorkston's (2005) 24 listening strategies on a 4-point scale. Two categories of strategies were highly endorsed: cognitive and linguistic. Twelve individual strategies were highly endorsed. However, listening strategy endorsement did not differ significantly between the two best and two worst listeners of each speaker. Results indicate there are common strategies endorsed by listeners of speakers with dysarthria, however, further investigation is warranted.

## **DEGRADATION OF PATHOGENIC PRION PROTEIN IN LANDFILL LEACHATE USING ALKALINE BURIAL MATERIALS**

Sara Krizan, and Joel Pedersen (Mentor), Soil Science

The pathogenic prion protein conformer (PrP<sup>Sc</sup>) implicated in chronic wasting disease (CWD) of deer and elk and bovine spongiform encephalopathy (“mad cow” disease) of cattle, persists in conditions normally conducive to protein degradation. Four alkaline burial materials (FA1, FA2, CK, and AL) were investigated for PrP<sup>Sc</sup>-degrading ability. Brain homogenate (BH) from prion-infected hamsters was added to the filtrate from suspensions of the alkaline burial materials. Time-resolved samples were analyzed by immunoblotting (Western blotting). Preliminary results indicate that the solids FA1 and FA2 reduced PrP<sup>Sc</sup> signal over time. This research will inform strategies to manage prion-infected materials.

## **THE ROLE OF NEONATAL TESTOSTERONE IN THE DEVELOPMENT OF CAROTID BODY MORPHOLOGY IN MALE RATS**

Agnieszka Kubica, and Mary Behan (Mentor), Comparative Biosciences

Steroid hormones exert powerful effects in the central nervous system during development. Little is known about sex differences in the development of peripheral chemoreceptors and their contribution to sexual dimorphism in respiratory diseases such as Sudden Infant Death Syndrome. The primary peripheral chemoreceptor, the carotid body, undergoes changes in early postnatal life when changes in testosterone levels are also occurring in male rats. The purpose of this study was to determine the effect of postnatal testosterone on carotid body morphology. We gonadectomized (GDX) or sham gonadectomized (sGDX) male rat pups at birth. We found that carotid body volume and the Type I cell count were greater in GDX than in sGDX pups. Thus it appears that carotid body morphology is influenced by neonatal testosterone.

## **INCREASING THE POTENCY OF A CYTOTOXIN WITH AN ARGININE GRAFT**

Vanessa Kung, and Ronald Raines (Mentor), Biochemistry

Variants and homologs of bovine pancreatic ribonuclease (RNase A) can exhibit cytotoxicity toward human cancer cells if they are endocytosed by the cells. This study demonstrates that an 'arginine graft,' or replacement of an anionic patch (Glu49 and Asp53) on the surface of RNase A with arginines, increased the cytotoxicity of RNase A toward human cancer cells, while not affecting its catalytic activity or affinity for the cytosolic ribonuclease inhibitor (RI) protein. Additionally installing a nonarginine domain to the C-terminus of this cationic RNase A variant generated one of the most cytotoxic RNase A variants known. This work revealed a rational method of improving the efficacy of ribonucleases and other protein therapeutics that require cellular internalization.

## **EVOLUTION OF SPURGE FLOWERING STRUCTURES**

Raman Kutty, and David Baum (Mentor), Botany

Euphorbia, one of the largest plant genera, is readily characterized by its unique flowering structure, the cyathium. This structure is composed of outer male structures and a single inner female structure all enclosed in a green or showy cup-like structure. Currently, there is a significant debate regarding the origins of the cyathium; it may be a single flower, a collection of reduced flowers (one female and many male), or some sort of intermediary. Using molecular analysis, we will determine the phylogenetic history of Euphorbia. This phylogeny will illustrate the evolutionary path Euphorbia has followed, and clarify the debate over the evolution of the cyathium. The LEAFY (LFY) gene has proved excellent for this analysis; it is active in the cyathium, and as a critical gene for floral production (and reproductive fitness), sequence conservation is high. Using nucleotide primers flanking the second intron of LFY, we have been able to amplify the intron through standard PCR; the genetic sequence of which will be the focus of our study. My research to date has discovered multiple PCR products from genomic DNA, indicating the potential for the presence of multiple copies of LFY. Hence, sequencing will include bacterial transformation and sequencing of multiple clones in order to determine the diversity of different sequences in the genome. Sequences from an array of species in Euphorbia and related outgroups (total  $n > 15$ ) will be compared to one another. Genome walking will provide elongated sequences (and hence, more points of comparison), which will strengthen the power of the study. These techniques will be used to estimate a phylogeny for Euphorbia.

## **CHARACTERIZING MUTANTS DEFICIENT IN NUCLEAR RNA INTERFERENCE**

Jennifer Lachowiec, and Scott Kennedy (Mentor), Pharmacology

Proper gene expression is crucial for all cell processes, and changes in normal gene expression have been implicated in a number of human diseases, including asthma, heart disease, and cancer. One form of gene regulation is RNA interference (RNAi). Using forward genetics, we have identified novel genes that regulate gene expression by targeting pre-mRNAs in the nucleus. We have found that three of these proteins act downstream of previously characterized RNAi proteins known to regulate mRNA levels. Two of these proteins are evolutionarily conserved. Our results strongly suggest that the three proteins act in the same pathway. A greater understanding of the basic mechanisms of RNAi will help maximize its use as a therapeutic to treat disease.

## **EFFECT OF CONTROLLED RELEASE FERTILIZATION ON NITROGEN LEACHING AND MORPHOLOGY IN RED PINE SEEDLINGS**

HyunKyung (Chloe) Lee, and Ryosuke Fujinuma (Mentor), Soil Science

Controlled-release fertilizer (CRF) may provide a balance between plant production and environmental impact by reducing nitrogen leaching without sacrificing seedling productivity and morphological qualities. In a bareroot tree nursery in northern Wisconsin over a course of two years, red pine (*Pinus resinosa*) seedlings were treated with conventional fertilizer (466 lbs/acre), CRF1 (456 lbs/acre), and CRF2 (247 lbs/acre) in five replicates per treatment using complete randomized design. We analyzed nitrogen content in plant tissues and measured seedling morphology. Seedling morphology and tissue nitrogen content showed no significant difference among treatments. Based on a mass-balance, smaller nitrogen input from CRF2 reduces nitrogen leaching without sacrificing productivity. These findings may help nursery managers to better manage soil fertility with less environmental impacts on adjunct ecosystems.

## **ENGAGING ELEMENTARY STUDENTS IN AFTER-SCHOOL SCIENCE CLUBS**

Emily Leibold, Meghan Tauber, and  
Dolly Ledin (Mentor), Center for Biology Education

Newly implemented in fall of 2007, this program focuses on the spreading of science education to youth in Madison. Elementary students have been educated through experiments, speakers and, most important, college mentors in specific scientific fields. Our presentation will show the benefits of starting science young, of integrating hands-on learning to increase understanding, and the importance of implementing inquiry-based instruction. By displaying our enthusiasm as a team and demonstrating common projects done during the science club, we hope to generate interest in our developing program.

## **GENIUS ETHICISTS: HOW ANCIENT WRITERS PRESERVED ORAL TEACHINGS THROUGH SOCIOPOLITICAL DECLINE**

Alex Leites, and Marc Kleijwegt (Mentor), History

This project explores the philosophical schools that arose simultaneously in the 6th and 5th centuries B.C. across the world, whose writings have had a lasting impact on those cultures to this day. Research of secondary sources about the historical context of ancient China, Greece and Israel and a close reading of their representative philosophical texts were conducted to illuminate why these ancient ethical writings were so significant. Preliminary results suggest that this intellectual 'golden age' occurred in response to pressing sociopolitical problems in each society and that the myths within the philosophical literature are key elements of ethical teaching. It is hoped that such a comparative approach uncommon in the study of the ancient world will enliven our understanding of these writings.

## **THE LINK BETWEEN PARENTAL SUPPORT, STRESS LEVELS, COPING MECHANISMS, AND PSYCHOLOGICAL ADJUSTMENT**

Aviva Levi, Valerie Schmidt, Anne Thurow, Nicole Witt, and  
David Lambert (Mentor), Human Development and Family Studies

The transition to college can prove to be challenging for many students. One factor that may facilitate a successful transition is parental support. The purpose of this study is to examine the interrelationships between parental support, stress, coping, and adjustment. Participants will include approximately 150 freshman and sophomores living in on campus. Parental support will be measured using the Maternal Support and Paternal Support scales (Valentiner 1994). Stress, coping, and adjustment will be assessed using the Perceived Stress Scale (Friedlander 2007), Ways of Coping Checklist (Valentiner 1994), and the Well-Being and Distress scales (Valentiner 1994), respectively. Data will be collected by March 31, 2008. We hypothesize that parental support will be positively correlated with lower stress, more problem-focused coping, and better adjustment.

## **SEX DETERMINATION IN THE LIMBS OF CROCODILIANS AND HOW IT MIGHT HELP IDENTIFY THE SEX OF DINOSAURS**

Carolyn Levitt, and Dana Geary (Mentor), Geology and Geophysics

A method of identifying sex in dinosaurs has yet to be discovered. By looking at the osteological differences between the sexes of crocodilians, who share a common ancestor with dinosaurs, we may be able to determine how to correctly sex dinosaurs. We measured the lengths and circumferences of the forelimbs and hindlimbs of seven species of crocodilians. We compared the ratios between forelimb elements and the ratios between hindlimb elements in males versus females to see if the sexes can be distinguished on this basis. Our results indicate that there are measurable differences in limb elements between the sexes of crocodilians, which may ultimately provide a tool for sexing osteological remains of both crocodilians and their dinosaurian relatives.

## **DELETION OF IKK GENE DECREASES OBESITY IN MUS MUSCULUS**

Sarah Li, and Hai Zhang (Mentor), Physiology

The hormone Leptin, discovered by Dr. J Friedman at Rockefeller University, is responsible for regulating satiability signaling in the hypothalamus. Studies have found that environmental factors such as a high-fat diet may induce leptin resistance by decreasing the hypothalamus sensitivity to leptin. A gene recently discovered, called IKK, was shown to be responsible for an organism's susceptibility to leptin resistance or desensitization. Current research involves deletion of the IKK gene to determine if this will decrease obesity induced by a high fat diet in mice (*Mus musculus*). Our study monitored the body mass of IKK- and IKK+ mice taking measurements biweekly over a period of several weeks. Analyzed data was checked for a decrease in IKK- mice. Data from this experiment show a decrease in obesity of IKK- mice when compared to wild-type (IKK+) mice.

## **A SLOW RECA PROTEIN**

Hao Li, and Michael Cox (Mentor), Biochemistry

A conserved (K/R)X(K/R) motif is found at the subunit-subunit interfaces in bacterial RecA protein filaments. In the *E. coli* RecA protein, this motif is made up of residues K248 and K250. Both of these residues have a role in ATP hydrolysis and in the transmission of conformational information across the interface. A K250R mutation creates a RecA protein that promotes both ATP hydrolysis and DNA strand exchange at a six-fold lower rate than the wild type protein. *E. coli* strains overexpressing this mutant RecA protein also grow much slower than wild type strains. Suppressor mutations appear quickly, and most suppressor mutations inactivate RecA protein. One suppressor mutation, K250R A11V, did not inactivate the RecA protein, but instead produced a RecA variant that allowed normal rates of growth under normal growth conditions. The characteristics of this suppressor mutation and the purified mutant protein containing it will be reported.

## **STUDY OF THE REACTOR ANTINEUTRINO SPECTRA MEASURED IN THE DAYA BAY $\theta_{13}$ EXPERIMENT**

Ho Ling Li, and Karsten Heeger (Mentor), Physics

The Daya Bay reactor neutrino experiment is a multi-national project to study neutrino oscillation by using antineutrinos released by the Daya Bay nuclear power plant in China. The aim of the experiment is to make a precise measurement of the yet unknown neutrino mixing angle  $\theta_{13}$  with a sensitiv-

ity of 0.01 in  $(\sin(2\theta_{13}))^2$  by measuring the flux and spectrum of electron antineutrinos. We study variations of the nuclear fuel composition in the reactor and the resulting changes in the antineutrino flux from the fuel burning process. By using information on the varying fuel composition and the antineutrino cross-sections, we calculate the antineutrino spectra measured in the eight detectors in the Daya Bay experiment and compare them to the neutrino oscillation effect due to various values of  $\theta_{13}$ .

## **CROSS-LINGUISTIC EXAMINATION OF PHONOLOGICAL ACQUISITION**

Jay Lim, and Jan Edwards (Mentor), Communicative Disorders

Numerous studies have explored how children learned the sounds of languages, but their interests have mostly been limited to English. In the paidologos research project, Dr. Edwards and her colleagues investigated the acquisition of speech sounds across several languages, including English, Greek, Japanese, Cantonese, Mandarin, and Korean. For each language, they asked children of age 2 to 5 and adults to repeat a single word beginning with a consonant, and let native-speakers transcribe and acoustically analyze the recorded data. The result showed that children learned sounds in different orders, depending on their native languages. These language-specific differences on the order of phoneme acquisition depended on the frequencies of the sounds in the languages and differences in fine phonetic detail.

## **INFLAMMATORY RESPONSE AND COLLAGEN TURNOVER FOLLOWING PULSED DYE LASER TREATMENT OF VOCAL FOLDS**

Ya Lin, and Nathan Welham (Mentor), Surgery

The 585-nm pulsed dye laser (PDL) is commonly utilized for the treatment of vascular and epithelial vocal fold lesions, however there are anecdotal reports that it may improve scar outcomes, perhaps by altering extracellular matrix (ECM) turnover, in certain patients. The purpose of this study was to evaluate the effects of PDL treatment on a selected group of inflammatory and procollagen/collagenase genes in normal rat vocal folds, and vocal fold fibroblast cells. Vocal folds and fibroblasts were treated with 20–80 J/cm<sup>2</sup> PDL fluence and harvested at three time points. The mRNA expression profiles of TGF- $\beta$ 1, COX-2, IL-1 $\beta$ , IL-6, MMP-8, MMP-13, Procollagen 1 and Procollagen 3 were examined using real time RT-PCR. Our results indicated a stable inflammatory response alongside alterations in procollagen/collagenase expression, suggesting that PDL treatment does alter gene expression of fibroblasts within the vocal fold ECM.

## **MORPHOLOGY AND VELOCITY STRUCTURE OF THE LUNAR SODIUM TAIL**

Michael Line, and Edwin Mierkiewicz (Mentor), Physics

The moon is known to possess an extended tail of lunar sodium atoms that is presumably formed when high-energy solar wind particles and meteorites liberate sodium atoms from the lunar surface with velocities greater than the lunar escape velocity. These atoms are propelled outward in the anti-solar direction by radiation pressure in a process similar to that of a comet. Our early observations determined that the average radial velocity of the lunar sodium tail in the vicinity of the anti-lunar point (i.e., looking down the lunar tail as it moves beyond the Earth, along the Sun-Moon-Earth line) is 12.5 km/s. We recently used the Wisconsin H-alpha Mapper (WHAM) to investigate the intensity and velocity distribution of this emission over a 15 by 15 degree region on the sky near the anti-solar point. In this poster we will discuss these spatial maps and our recent comparative dynamical modeling of this emission. A University of Wisconsin Hilldale award for undergraduate research supported this work.

## **DEVELOPMENTAL PLASTICITY OF DIGESTION IN ALTRICIAL BIRDS**

Linda Lor, and William Karasov (Mentor), Forest Ecology and Management

The goal of this research is to compare the timing and magnitude of changes in intestinal morphology and biochemistry in species with different types of nestling diet, and to test whether these changes are genetically programmed during development, or altered by diet composition. House sparrow and zebra finch nestlings are fed two diets, starch-rich and starch-poor. The diets are made to imitate the seed or insect-rich natural diets in the wild. I will compare masses of organs (gizzard, intestine, pancreas, and liver) as a function of age and diet within each species, and compare across the species the patterns of change. The findings will advance knowledge of the digestive system of birds with the altricial mode of development, which unlike poultry are born rather undeveloped and unable to feed themselves.

## **THE KINDLING MODEL OF EPILEPSY**

Derek Lumbard, Zach Pflum, and Thomas Sutula (Mentor), Neurology

We are interested in furthering our knowledge about the consequences that epilepsy has on the brain. Our specific goal is to examine the consequences of repeated seizures in a reliable rat model of epilepsy. Working with the rats, we provide periodic twice daily electrical stimulus trains to the hippocampus, a region of the brain implicated in epilepsy, that result in seizures. During the procedure, we closely monitor the rat's behavior as well as the brain activity to determine seizure severity. This process, known as kindling, results in permanent functional alterations which increase susceptibility to additional seizures. Over time their brains form new connections, which eventually result in spontaneous seizures: the defining characteristic of epilepsy. Our main goal is to understand the molecular, cellular, and systems alterations that contribute to progression of epilepsy, and to ultimately apply our research to helping humans in therapeutic or clinical settings.

## **THE BIOCHEMICAL CHARACTERIZATION OF A TRANSLATIONAL REPRESSOR**

Xinwei Luo, and Richard Eisenstein (Mentor), Nutritional Sciences

Iron regulatory proteins (IRP) are crucial post-transcriptional regulators of iron metabolism. IRP influence the synthesis of proteins controlling iron metabolism by binding to their mRNAs. IRP1 can incorporate an iron-sulfur cluster to double function as the enzyme cytosolic aconitase (c-acon). Since mRNA binding and c-acon activity are mutually exclusive, cluster incorporation serves as an iron-dependent regulatory switch between the two forms. This project aims to isolate and biochemically characterize different forms of IRP1 to understand how it is regulated. Polysome profiles were used to isolate forms of IRP1 based on their presence in actively or inactively translated pools of mRNA followed by their functional characterization (e.g. aconitase activity). My research will allow further understanding of IRP1 as an agent of regulatory control.

## **ETHYLENE STIMULATED NUTATIONAL ANALYSIS IN ARABIDOPSIS MUTANTS**

Jay Luthar, and Brad Binder (Mentor), Horticulture

Ethylene has been a known plant hormone for some time, but the exact mechanisms of signal transduction are still veiled in a web of unknown biochemical pathways. The Arabidopsis species is an ideal plant to use as a model, because mutants are readily available. Historically, the effects of ethylene on the Arabidopsis plant have also been studied extensively. Recently it was discovered using time-lapse imaging, that ethylene stimulates nutational bending. This appears to be controlled independently from other responses. This research project will use time-lapse computer imaging to compare nutational bending of various mutants to understand the signaling mechanism. Using a protractor, angles will be measured from the images gathered. Using this quantifiable data, various hypotheses of the signaling pathway can be tested.

## **EFFECT OF GENETICALLY RAISING N-3 FATTY ACID LEVELS IN PORK ON LIPID OXIDATION DURING FROZEN STORAGE**

Melissa MacDonald, and Mark Richards (Mentor), Animal Sciences

Long chain omega-3 fatty acids (LCn-3FA) are prevalent in certain fish species and are believed to be beneficial to human health. However these fatty acids sometimes oxidize during storage which will impart undesirable odor and flavor in foods containing them. This work examined the formation of lipid oxidation products in loin muscle from a transgenic line of pigs that have elevated levels of LC-n3FA. The incorporated gene converts n-6 fatty acids into n-3 fatty acids. Lipid oxidation products were not elevated in stored muscle from transgenic pigs compared to muscle from a control pig that lacked the transgenic gene. Thus these studies suggest that transgenic technology can be used to increase the amount of desirable LCn-3FA in muscle without compromising sensory quality of the meat.

## **SUPPLY CHAIN MANAGEMENT IN STREET MARKETS**

Tyler Marcus, and Alfonso Morales (Mentor), Urban and Regional Planning

In order for street vendors to be successful in business, it is crucial that they manage the inventory of goods they sell to consumers. To do this well, street vendors must have a good understanding of how to manage their supply chain. In this research, to effectively understand supply chain management

in the street markets, a comparison between supply chain management in street vending and big business was made. The comparison allows for an explanation of three important concepts to supply chain management—understanding consumer demand, ‘strategic’ supply chain, and relationship dynamics of suppliers and sellers. Also, the errors in supply chain management for street vendors are discussed as a way to demonstrate the consequences of not having a consistent supply of goods.

## **GEOPOLITICAL IMPACTS OF THE BRONZE NIGHT IN ESTONIA**

Serge Margovsky, and Robert Kaiser (Mentor), Geography

This research looks at the changes in power, place, and identity in the region of the Estonian-Russian border. Of specific interest are the effects of the removal of a bronze Soviet war memorial on this discourse. These effects will be examined through the critical analysis of images created by policy-makers, academics, and popular media. Special attention has been paid to the changing identity of the minority Russian population in Estonia, and its strive for citizenship. Upon examination of the above-mentioned sources, it becomes clear that even socially opposed groups have appropriated the events of the ‘bronze night’ to alter the border narratives and processes of the region. Ultimately, we hope to gain a more comprehensive understanding of the relationship between events and geopolitical discourses.

## **THE GENESIS AND SIGNIFICANCE OF THE BASSOON CONCERTOS OF ANTONIO VIVALDI**

Julia Marion, and Marc Vallon (Mentor), Music

The 18th-century composer Antonio Vivaldi composed 38 complete bassoon concertos. They constitute a significant portion of the repertoire for bassoon and represent the first effort by a composer after the bassoon’s development in the 17th century to exploit its expressive and soloistic capabilities. These concertos have never been published in a complete and exclusive edition, so their availability to students and performers has been limited. The purpose of this project is to study and publish Vivaldi’s bassoon concertos in facsimiles. This will transmit the compositions directly to the musician without an editor’s intervention, allowing for greater awareness of 18th-century performance practices. The project entails the research of the historical context in which they were composed and their performance on a period instrument.

## **UW–MADISON PRE-MED STUDENTS UNAWARE OF OPPORTUNITIES IN CLINICAL RESEARCH: A CASE STUDY**

Alyce Marsh, and Lori L. Bakken, (Mentor),  
Institute for Clinical and Translational Research

Many students intend to pursue professional medicine; however few are knowledgeable of medical clinical research opportunities as undergraduates. A two-semester curriculum was designed for a single student to investigate careers in human subjects research. Activities included completing privacy certificate programs, shadowing respected researchers, interviewing individuals at various degrees of achievement, library research training, conducting a clinical research interest survey, and a literature review. Activities were gauged through reflective summaries and compiled. Student outcomes were intent to pursue an additional undergraduate major, desire of a professional degree in accordance with medical degree, and increased research involvement. The results are a promising educational model to further undergraduate scholarly ambitions and contest the national need for clinical researchers. Further studies are needed to investigate long term effects.

## **MASON BROTHERS' RED OWL: A PAST, PRESENT AND FUTURE LOOK AT A FAMILY BUSINESS**

Jared Mason, and Ann Kinkade (Mentor), General Business

My project looks at Mason Brothers' Red Owl, the small business that my family has owned and operated in Green Bay, Wisconsin, since 1969. I will be presenting a past, present, and future perspective of the company. My research includes a presentation of the company's history and its foundational beginnings. To show the present perspective and future opportunities of the company I will use a computer to demonstrate our web site and also display a written business plan to outline our future plans. This research is based on interpersonal interviews and gathering records and documents from early years along with making future projections based on current marketplace conditions. The poster will contain a business profile summarizing financials, history, strategy, and other aspects of the business.

## **TRAINING SPARSE SINGLE LAYER FEED-FORWARD NEURAL NETWORKS ON CHAOTIC DATA**

Adam Maus, and Julien Clinton Sprott (Mentor), Physics

Finding the underlying patterns of chaotic data has been the holy grail of Chaos Theory. Examples of chaotic data include the fluctuations of the stock market, weather, and many other natural systems. However, patterns in this data have proven to be elusive. Fully connected artificial neural networks have been used in modeling and their sparse counterparts offer a new hope for finding patterns in chaotic data. By removing connections from fully connected neural networks, sparse networks have the potential to discern the dimension of the input data. The knowledge gleaned using sparse neural networks could create more accurate models and a better understanding of the original data. From simulation of chaotic data, application of these patterns to real life phenomena may prove to be possible.

## **ZEBRA MUSSELS VS. QUAGGA MUSSELS: DIFFERENCES OF SUBSTRATE ATTACHMENT IN FLOW**

Alice McCarthy, and Carol Lee (Mentor), Zoology

The invasive zebra mussel (*Dreissena polymorpha*) was followed to the great lakes by another invasive mussel, the quagga mussel (*Dreissena bugensis*). Quagga mussels appear to be displacing zebra mussels in most habitats. Yet, zebra mussels may still have a dominant hold on areas with large hydrodynamic forces, such as wave-prone shores and rivers. This persistence is possibly due to zebra mussels having stronger or faster production of byssal threads, which mussels use to attach to hard substrates. The results of this experiment indicate that zebra mussels produced byssal threads at a faster rate and were able to stay attached for longer periods of time when exposed to quickly flowing water.

## **MATERNAL DEPRESSION AND SLEEP CONSISTENCY IN PRETERM AND LOW BIRTHWEIGHT INFANTS**

Hannah McDougall, Gao Yang, and AJ Schwichtenberg (Mentor),  
Human Development and Family Studies

This study explores the associations between infant sleep consistency and maternal depression in infants born preterm or low birth weight. A measure of sleep consistency was developed using maternal reports of infant sleep. Correlations between infant sleep consistency and maternal scores on the Center for Epidemiological Studies Depression Scale (CESD) were assessed when infants were 4 and 9 months postterm. This study found significant correlations between higher maternal CESD scores and more infant nighttime sleep inconsistency at 4 and 9 months. These findings support a bidirectional relationship between maternal depression and infant sleep consistency. The results of this study suggest that early intervention services and screenings may improve outcomes for both mothers and infants.

## **THE PROMISES AND PITFALLS OF FORMALIZING RECYCLING IN BUENOS AIRES, ARGENTINA**

Megan McGuire, and Brad Barham (Mentor),  
Agricultural and Applied Economics

This project explores transformations in the structure of informal recycling (scavenging) that have been occurring in Buenos Aires, Argentina, since the mid 1990s. It focuses on the formation of scavenger cooperatives and on government attempts to formalize the activity, both of which hold important implications for the welfare of the 15,000 informal recyclers, or *cartoneros*, who work within the city limits. Research was conducted through a review of literature on informal recycling in developing countries and case studies of the Buenos Aires experience, and through consultation with local experts and the city's periodicals. Initial results indicate that the changes may present opportunities to improve the well-being of cartoneros in well-organized cooperatives, though the effects of these changes on unassociated cartoneros is less clear.

## **ISOLATION AND PURIFICATION OF AN ANTIMICROBIAL AGENT FROM ENTEROBACTER GERGOVIAE**

Kayla Menard, and Walter Goodman (Mentor), Entomology

Water molds are pathogenic organisms responsible for considerable economic loss to the agricultural and aquacultural industries. This is due, in large part, to the limited number of pesticides available for their control as well as the development of resistant strains. For these reasons, development of new and safer pesticides that control the growth of water molds is of considerable interest. The bacterium *Enterobacter gergoviae* secretes an antimicrobial agent that inhibits the growth of water molds. The purpose of this project is to isolate the antimicrobial agent from bacterial cultures, purify it, and to chemically characterize it. This is currently being carried out to determine if the antimicrobial agent is a novel substance that may be used as an effective pesticide against water molds.

## **ULTRASONIC MEASUREMENTS IN THE DAYA BAY ANTINEUTRINO EXPERIMENT**

Patrick Mende, and Karsten Heeger (Mentor), Physics

My work focused/focuses on the ultrasonic measurements of the thickness of the acrylic vessels as well as the overflow tank liquid levels in the Daya Bay antineutrino experiment. Initial tests have been performed to test the viability of using thickness gages purchased from NDT Systems to measure the thickness of a variety of materials as well as measuring liquid levels. The viability and precision of the thickness gages has been confirmed to be more than adequate for use as a system for verifying the sameness of the thickness of the eight sets of acrylic vessels being used in the Daya Bay experiment; viability and precision tests for using the thickness gages as a tool to measure depth levels are still being performed.

## **DIFFERENCES IN FAMILY OWNED AND CORPORATE RESTAURANTS**

Sally Merckx, Marco Spada, and Ann Kinkade (Mentor), General Business

This project is based on a comparison of family-owned restaurants vs. corporate chain restaurants. We decided to do our project on the restaurant industry based on personal involvement and also the growing number of restaurants in the Madison area. The research for this project was based on answering three different questions, is there a difference in values or experiences between family-owned and chain restaurants? How do financial aspects compare? How do employee relations differ between family-owned and chain restaurants? Our poster looks at both data from scholarly sources, and our own research done in the Madison area. To conduct our research we chose two family restaurants and two corporate restaurants in the Madison area. This poster highlights what our findings were.

## **PRIMARY TEXTS REGARDING THE HAITIAN REVOLUTION**

Andrew Miller, and Deborah Jenson (Mentor), French and Italian

As a recipient of the Hilldale Fellowship and in collaboration with Professor Jenson, I visited libraries and national archives in Paris and Aix-en-Provence in order to consult and provide a reliable transcription or copy of primary texts (newspapers, proclamations, letters, etc.) regarding the Haitian revolution and its immediate aftermath. These texts have provided corroborating evidence contesting published dates (primarily with respect to Dessalines' coronation as Emperor) and will serve as a template for more contemporary translations of Dessalines' most important proclamations. The research has also provided insight into the French press' coverage (or lack thereof) of the events in the former French slave colony and will hopefully provide a meaningful contribution to the wealth of data and research available to the burgeoning field of Haitian studies.

## **EFFECTIVENESS OF ECO-TOURISM IN PROMOTING MANGROVE CONSERVATION IN THE AMERICAS**

Nicole Miller, Tom Prestby, Marcelle Richards, and Jim Berkelman (Mentor), Forest and Wildlife Ecology

Mangroves are a crucial ecosystem for a vast diversity of species. This study focuses on the significance of mangroves to bird and American crocodile populations in the Americas, while looking at the differences in management across regions. We draw upon our personal study of La Manzanilla, Mexico,

which we visited with our Wildlife Ecology 375 class, and literature research from the U.S. and Central and South American countries. In this comparison, we evaluate the effectiveness of eco-tourism and local policies in conserving these unique habitats. We focus on crocodiles and birds because they are the main draws for ecotourism in the mangroves and their communities rely heavily on this habitat. The main challenge to conservation efforts in this ecosystem is habitat loss due to development.

## **TOWARD DEVELOPMENT OF A NEW DIAGNOSTIC TEST FOR POLYCYSTIC OVARY SYNDROME**

Carrie Miller, Sehrish Rana, and Fariba Assadi-Porter (Mentor), Biochemistry

Polycystic Ovary Syndrome (PCOS) is a complex disease that has both genetic and environmental links. PCOS is characterized by anovulation, increased androgen levels, and polycystic ovaries. Research is being conducted to explore the pathogenesis of PCOS and determine the metabolic alterations that result in PCOS. Blood and urine samples of PCOS patients and control subjects were labeled for NMR spectroscopy, to provide information regarding metabolites altered by PCOS. By comparing metabolites between PCOS and control groups, we can attempt to identify those pathways involved in the pathophysiology of PCOS and provide a first diagnostic test for this syndrome. As research progresses on PCOS, better diagnostic procedures will be available, treatment will improve, and preventative steps can be taken to avoid the condition if possible.

## **EGYPTIAN RESPONSES TO THE EXECUTION OF SADDAM HUSSEIN: RHETORIC, THE DIALOGIC AND GRIEVANCES AGAINST THE UNITED STATES**

Mona Mogahed, and Christine Garlough (Mentor), Communication Arts

Reports indicate that much of mainstream Arab reaction to the execution of former Iraqi President Saddam Hussein was characterized by a renewed sense of grief, anger, and resentment toward the United States for its complicity in the ‘martyring’ of an Arab leader. This occasion provided a rich case study for investigating the rhetorics that construct Arab grievances against the United States. Focusing on community reactions in Cairo, I utilized a multi-method approach of ethnographic fieldwork (interviews, participant-observation, and archival research) for data collection, and dialogic analysis of narratives for data analysis. In conducting this research, I hope to contribute to an increasing body of scholarship in Anthropology and Rhetoric that investigates cultural-political interpretations to illuminate and help reconcile the seemingly different worlds that conflicting communities inhabit.

## **THE UNEXPECTED ROLE OF ACTION IN INFANT WORLD LEARNING**

Joshua Moon, and Arthur Glenberg (Mentor), Psychology

Recent data from infants have shown correlations between maturation of specific motor skills (e.g., clapping) and acquisition of the corresponding verbs. This experiment investigates the possible link between action and language acquisition. In the three-phase experiment, infants will first be familiarized with bimanual hand actions. Infants will physically learn two bimanual hand actions and passively observe two bimanual hand actions. In the second phase, the infants will be exposed to the names of those actions. Finally, infants will be tested on the novel hand actions using the preferential looking method. If the infants are better at matching the names to actions they themselves learned to perform compared to actions they only observed, we will have demonstrated the causal link between language and action.

## **CHINESE NEO-IMPERIALIST TRADE IN AFRICA**

Amy Moser, and Jeremi Suri (Mentor), History

This project analyzes Chinese neo-imperialist trade to control raw materials access in Africa, and how this negatively affects human rights and the ability of the international community to improve governance in pariah states. The objective is to provide evidence that China is pursuing neo-imperialist trade, focusing on a case study of Zimbabwe. I traveled to the Library of Congress in January to conduct research. I found that China has 800 firms operating on the continent, including oil investments in governments accused of human rights abuses, such as Sudan, Angola, and Nigeria. In conclusion, I plan to show that as a member of the international community, China can be influenced to change harmful trade policies if negative international press affects China's political and economic interests.

## **ALLELIC VARIANCE IN WISCONSIN BLACK-CAPPED CHICKADEE (*POECILE ATRICAPILLUS*) POPULATIONS**

Melanie Mossing, and Mark Berres (Mentor), Animal Sciences

It is generally accepted that natural populations genetically diverge between geographically separated areas. However, research assessing the genetic structure in a non-migratory species on a more local scale is rare. Therefore, one particular question arises, will there be allelic gradients arising due to distance effects found within these populations along a similar geographic gradient? To assess the magnitude of genetic variation in Black-capped Chickadee populations (*Poecile atricapillus*) along a latitudinal gradient in Wisconsin. Blood samples will be collected from healthy birds at six sites along a latitudinal gradient across Wisconsin and the samples will be analyzed for genetic polymorphisms. This study will evaluate the magnitude of population structure, specifically the presence of an allelic gradient, in a large, non-migratory bird population.

## **KV11.1 AND MIRP1 ARE TRANSPORTED TO THE CELL SURFACE IN DISTINCT PATHWAYS**

Brooke Moungey, and Craig January (Mentor), Medicine

Sudden Cardiac Death (SCD) affects approximately 330,000 adults in the United States each year. One cause for SCD is associated with Long QT Syndrome (LQTS). LQTS increases the risk for arrhythmia and is a condition characterized by a lengthening of the QT interval on the electrocardiogram. Congenital LQTS has been linked to mutations in the *KCNH2* and *KCNE2* genes, which encode the K<sup>+</sup> channel proteins Kv11.1 and MiRP1, respectively. Kv11.1 and MiRP1 co-assemble with one another to generate K<sup>+</sup> current in the heart that is important for normal cardiac function. Kv11.1 and MiRP1 have been hypothesized to co-assemble inside the cell prior to expression at the cell surface membrane. However, my preliminary data suggest this may not be the case. I will test the hypothesis that Kv11.1 and MiRP1 do not co-assemble inside the cell, but rather these proteins are transported to the cell surface in distinct pathways. This study will help to identify the mechanisms that regulate Kv11.1 and MiRP1 transport and co-assembly, which may have implications for congenital LQTS patients that have mutations in these genes.

## **SPINAL CORD INJURY AND NEUROPATHIC PAIN RESEARCH: ANTIHYPERALGESIC EFFECTS OF CANNABINOID AGONISTS**

Mohamed Nasereldin, Francesca Norante, and  
Gurwattan Miranpuri (Mentor), Neurological Surgery

Neuropathic pain (NP) is a major problem for patients suffering from spinal cord injury (SCI), characterized by burning and needle sensations. Little is known about the mechanisms behind the development of this pain syndrome. Cannabinoids (CBs) are substances that bind to CB receptors and have been shown by previous studies to reduce NP. The goal was to isolate the CB receptor in order to determine its role in the development of NP following contusive SCI (cSCI). This was accomplished by assessing the effect of the CB1 & CB2 agonist, WIN 55,212-2 (WIN), and the CB1 & TRPV1 agonist, Anandamide (AEA), on the development of chronic NP in rats following cSCI.

## **ACTION IN SUDAN**

Jacob Naughton, and Renee Alfano (Mentor), Student Organization Office

Action in Sudan is a campus/community organization that raises awareness about the current genocide in Darfur. In addition, we raise funds through a variety of events for a reconstruction project operating in Southern Sudan. We also take political action, primarily regarding a targeted divestment bill at the state level. Our other area of political focus is China's unacceptable business relationship with Sudan. Today we will share a video about the history of Sudan with you and we will also be available to discuss and answer questions regarding Sudan, the crisis in Darfur and the NGO we support.

## **PRIVATE MILITARY CORPORATIONS AND INTERNATIONAL POLITICS**

Chaya Nayak, and Kate McCoy (Mentor), Sociology

Despite the prevalence of private military corporations in our society, many people know little about these companies that protect our society, and are paid to keep order in foreign nations. There is little information about these companies that is easily available. This study will compile the sparse information about these companies that is available online, as well as by interviews and literary resources, and will create a database which will be made available to the public. The information will then be compared to determine the amount of involvement these various military organizations have in each country as well as what jobs they are doing in these countries and the effects they are having. This research will focus a large part of its efforts toward Columbia, as well as Iraq. In understanding these various military organizations, we will be able to project the effects of privatizing our army.

## **THE EGFR AND SRC FAMILY KINASES COOPERATE IN ACQUIRED RESISTANCE TO CETUXIMAB**

Meghan Nechrebecki, and Deric Wheeler (Mentor), Human Oncology

The EGFR is a receptor tyrosine kinase that plays a major role in oncogenesis. Cetuximab is an EGFR blocking antibody that is FDA approved for use in metastatic colorectal cancer and head and neck squamous cell carcinoma (HNSCC). Although cetuximab has shown strong clinical benefit many individuals become refractory to cetuximab therapy. In this communication we report that Src family kinases (SFKs) are highly activated in cetuximab-resistant cells and cooperate with the EGFR leading to acquired-resistance to cetuximab. Studies blocking SFK activity could restore sensitivity of resistant cells to cetuximab therapy. These results indicate that SFKs and the EGFR cooperate in acquired-resistance to cetuximab and suggest that combinatorial therapy targeting both SFKs and the EGFR may have strong clinical benefit.

## **REDUCING THE BURDEN OF DISEASE: DIABETES PREVENTION ON ALLIED DRIVE**

Alicen Nelson, Vijay Prasad, and Sharon Younkin (Mentor), Academic Affairs

Diabetes is an epidemic in the United States and disproportionately affects low income and minority populations, such as our target area, Allied Drive. We partnered with the Allied Wellness Center (which provides preventative and acute health care to neighborhood residents) to provide diabetes outreach programs designed to increase awareness and reduce risk factors for diabetes, including screenings, educational programs, fitness programs and a foot care clinic. This project benefited neighborhood residents and the Allied Wellness Center by providing targeted programming addressing an identified, high priority, need. It also benefited the student population by providing community service opportunities which involved diversity education, programming experience, and the opportunity to learn from a very unique community.

## **POSTPARTUM DEPRESSION AND INFANT ATTENTION REGULATION AND DYSREGULATION AT 12 MONTHS OF AGE**

Dan Newcomer, and Roseanne Clark (Mentor), Psychiatry

Postpartum depression is a significant public health problem affecting 10 to 15 percent of all new mothers. From the postpartum blues to the very severe major depressive disorder, postpartum depression can affect the functioning of the woman herself as well as that of her infant and partner. Disturbances in the mother-infant relationship may occur at a critical time in an infant's development when physiological, emotional, and attention regulation and are developing. This presentation will describe the larger randomized clinical trial examining the efficacy of a relational treatment approach for major depression in the postpartum period and preliminary findings on the attention regulation and dysregulation of these children at-risk at 12 months of age.

## **ASSOCIATIONS BETWEEN SLEEP QUALITY, BODY SIZE AND EATING BEHAVIOR IN COLLEGE STUDENTS**

Emily Nuss, and Suzanne Shoff (Mentor), Nutritional Sciences

The lifestyle of college students may be no 'lite' matter in a nation with two prevailing parallels: decline in sleep duration and an increase in weight. Poor sleep quality may increase risk of behaviors associated with weight gain, but it is unclear which aspects of sleep quality are associated with eating behavior and weight. This study of 1,028 college students will identify sleep characteristics associated with inadequate fruit/vegetable intake and overweight/obesity. The Pittsburgh Sleep Quality Index was used to assess sleep characteristics. Weight and height were measured. Fruit and vegetable intake was estimated using a questionnaire. Sleep inefficiency, poor sleep quality, and daily disturbances will be assessed. We hypothesize that one of these sleep characteristics is disproportionately associated with overweight and low fruit and vegetable intake.

## **EFFECTS OF TRENBOLONE ON FINAL OOCYTE MATURATION IN FATHEAD MINNOWS**

Diane O'Brien, and Terence Barry (Mentor), Animal Sciences

Most cattle in the United States are reared in concentrated animal feeding operations (CAFOs) and receive implants of trenbolone (TBN), a synthetic growth-promoting androgen. It was hypothesized that TBN inhibits final oocyte maturation in fathead minnows. As the egg matures, its nucleus, or germinal vesicle (GV), migrates from the center to the periphery and then disappears. This process is called 'germinal vesicle breakdown' (GVBD), and is regulated by the steroid hormone  $17\alpha,20\alpha$ -dihydroxy-progesterone (17,20-P). Fully mature oocytes with centrally located GVs were cultured *in vitro* for 24 hrs at 20°C and exposed to various doses of TBN and/or 17,20-P. As expected, 17,20-P stimulated a dose-dependent increase in GVBD. Trenbolone inhibited the stimulatory effects of 17,20-P. Synthetic androgens associated with CAFO effluent may cause endocrine disruption in fish.

## **SEASONAL AND VEGETATIVE EFFECTS ON EARTHWORMS IN LAWNS OF MADISON, WISCONSIN**

Michael O'Halleran, and Marie Johnston (Mentor), Soil Science

Earthworms play an important role in soil quality. Through their daily activity, they increase soil fertility and soil structure. Although earthworms are extremely important to our soil system, most research to date has focused on agricultural soils. Thus, the purpose of this research is to investigate earthworm populations within soils of the urban landscape. We ask whether planting a more diverse type of vegetation affects soil biology. We test the differences in earthworm abundance and diversity (maturity and pigmentation) for two types of vegetation (prairie plants and turf grass lawn) and for two seasons (spring and fall). We also consider soil qualities that influence earthworm dynamics, such as soil temperature, soil organic matter, and soil moisture.

## **FAMILY-CONTROLLED PUBLIC COMPANIES: GOOD OR BAD NEWS FOR INVESTORS?**

Peter Olesen, and Ann Kinkade (Mentor), General Business

Family-controlled companies comprise approximately 90 percent of all United States incorporated businesses and account for roughly 60 percent of all publicly traded companies. The purpose of this project is to examine the financial returns of family-controlled public companies versus non-family public companies. Expanding on a study by Ronald Anderson and David Reeb entitled 'Founding-Family Ownership and Firm Performance,' this project analyzes financial returns of family-controlled companies in the S&P 500 from January 1, 2001, through December 31, 2007. Results are expected to indicate that family influence in companies correlate to superior financial returns for public companies than their non-family counterparts. In addition, a case study is presented to illustrate the different means by which founding-families continue to exert influence over the publicly traded companies.

## **PRIVATE MILITARY CORPORATIONS AND INTERNATIONAL POLITICS**

Artur Oliveira, and Kate McCoy (Mentor), Sociology

Since the attacks on September 11, 2001, the United States Government (USG) has been heavily involved in overseas military programs. To support its branches of the military, the USG has been awarding contracts to private military corporations (PMCs) for many services. Many of these multi-million dollar contracts are awarded to these PMCs so they can provide security services, repairs, intelligence services, and other assistance to the USG and U.S. armed forces. Many questions have been raised about the future of wars and international politics and the role of PMCs in these matters, but the issue with this topic is that there is very little available information about PMCs. This lack of information stops people from understanding the roles of these companies and from making informed decisions. Our crucial first step has been to collect information on these companies through online research so that we can form a systematized database about them. We are also transcribing case study interviews about Colombia so that there can be more in-depth understanding about PMCs.

## **PEDIATRIC BRAIN DEVELOPMENT AND NEUROCHEMICALS MEASURABLE BY MAGNETIC RESONANCE SPECTROSCOPY**

Sunyoung Park, and Brendon Nacewicz (Mentor),  
Waisman Center, Center for Neuroscience

The research is intended to elucidate age-dependent and region-specific neurochemical changes by analyzing data collected from proton Magnetic Resonance Spectroscopy. Investigation of biochemical differences over the span of brain maturation is expected to answer why spatial and chemical volume changes in the brain occur. Statistical brain imaging techniques help detect levels of neurochemicals, such as N-Acetyl aspartate, choline, creatine, gamma-aminobutyric acid, and glutamate, in particular brain sections. Subjects consist of 30 males in the range of 10 to 25 years of age, with two subjects per each year of life. Each subject receives one MRS session of single-voxel PRESS sequence, and LCModel generates linear functions from resultant spectra. Novel neuroimaging technology is incorporated to confirm the intricate association between brain development and neurochemical measures.

## **THE ROLE OF SIGLEC-9 BINDING TO MUC16 CONTRIBUTING TO INHIBITION OF NATURAL KILLER CELLS**

Dhara Patel, and Manish Patankar (Mentor), Obstetrics and Gynecology

Ovarian cancer is the fifth leading cause of cancer deaths in women, the leading cause of death from gynecological malignancy. A majority of the ovarian tumors greatly express the high molecular weight mucin MUC16. MUC16 shed from the tumors is a potent inhibitor of NK cell mediated cytotoxicity. MUC16 binds to NK cells via the inhibitory receptor Siglec-9. The goal of this project is to demonstrate that the NK cell inhibitory effects of MUC16 are mediated via specific inhibitory signaling cascades emanating from the Siglec-9 receptor. We will employ Siglec-9 expressing Jurkat cells as a model in these studies. The Jurkat cells will be exposed to purified MUC16 and signaling cascades will be determined by Western Blotting and other conventional approaches.

## **IDENTIFYING THE EXPRESSION AND FUNCTION OF DEVELOPMENTALLY REGULATED GENE AE4-328 IN *Aedes aegypti***

Roshni Patel, and Que Lan (Mentor), Entomology

The purpose of this project is to identify the expression and biological function of Ae4-328 in the yellow fever mosquito, *Aedes aegypti*, the primary vector of dengue and yellow fever. Ae4-328 is a newly isolated and unknown gene within *Aedes aegypti* that has no known homologies. After cloning and sequencing the entire 3,846 bp gene, Northern blot has been used to determine the specific expression of Ae4-328 within *Aedes aegypti*. The results of the Northern blot suggest that it is expressed highly in only adult female mosquitoes, pointing to its possible involvement in development from female pupa to adult stages. RNA Interference (RNAi) will be used in adult mosquitoes to determine the basic biological function of the gene. The results of this research, although preliminary, will contribute to a more comprehensive understanding of *Aedes aegypti* development. Also, it could have far reaching significance in mosquito control and disease prevention.

## **DEPRESSION AND STIGMA IMPACT ON EARLY TREATMENT ACCEPTANCE IN YOUNG KENYA WOMEN DIAGNOSED WITH HIV**

Agnes Patenaude, and Linda Oakley (Mentor), School of Nursing

My goal in this narrative study was to determine the impact of Kenyan cultural beliefs on the depression and social stigma experiences of young Kenyan women recently diagnosed with HIV and facing complex decisions about their intentions to accept ongoing treatment. The social stigma of HIV also can indirectly increase depression by increasing risk of divorce or separation from a love relationship. Other causes of depression may include serious financial problems; and work-place difficulties. Results of my study of the personal narratives of young Kenyan women living with HIV showed an association between the women's cultural beliefs, their experience of social stigma, and their treatment intentions. Discussed as ways of improving treatment adherence are, cultural support systems, counseling, anti-stigma awareness campaigns and enhanced HIV education.

## **CHARACTERIZATION OF WILD TYPE AND TSP1-/- LUNG ENDOTHELIAL CELLS**

Stephanie Pedersen, and Nader Sheibani (Mentor),  
Ophthalmology and Visual Sciences

Thrombospondin-1 (TSP1) inhibits angiogenesis. Previous studies have shown TSP1-deficient (TSP1-/-) retinal endothelial cells as more proliferative and migratory than wild type (WT) cells. The purpose of this research is to characterize WT and TSP1-/- lung endothelial cells (LEC). LEC were isolated from mice. The identity of the LEC was assessed by FACScan and western blot analysis. Capillary morphogenesis was performed on matrigel. Proliferation was examined by quantifying cells at various times. Migration was evaluated by transwell and scratch wound assays. LEC expressed specific EC markers. TSP1 was absent in TSP1-/-LEC and present in WTLEC. WTLEC made organized, extensive networks. TSP1-/-LEC had compromised networks. TSP1-/-LEC proliferated faster. TSP1-/-LEC migrated faster and more cells migrated. These results confirm TSP1 as an angiogenesis inhibitor impacting migration and proliferation.

## **THIRD-PERSON EFFECT, POLITICAL ADVERTISEMENTS, AND INTENTION TO VOTE AMONG COLLEGE STUDENTS**

Christine Penn, and Dominique Brossard (Mentor),  
School of Journalism and Mass Communication

Broadly defined, the third-person effect assumes that others are more vulnerable to negative advertising effects than oneself. Past research has indicated that presence of such an effect can have direct behavioral implications. This study, based on a survey of college students in a large midwestern university, will investigate the impact of these behavioral implications on political involvement, by investigating the relationship between the third-person effect and the likelihood to vote in college students. The study will also look specifically at the way in which negative political advertising effects one's likelihood to participate through third-person perception.

## **INCREASING ECONOMIC OPPORTUNITIES FOR INDIVIDUALS WITH DISABILITIES IN NORTHWEST RURAL WISCONSIN**

Matt Pesko, and Kimber Malmgren (Mentor),  
Rehabilitation Psychology and Special Education

Despite the implementation of promising disability legislation over the last two decades and the desire to work of two-thirds of non-working individuals with disabilities, employment rates for people with disabilities have not improved over this span of time. The benefits for businesses in employing individuals with disabilities are numerous; unfortunately, these benefits are rarely taken advantage of and often not even known. The purpose of this study was to understand perceptions of employers on hiring persons with disabilities, categorize the models used for employer outreach by disability service providers, and apply a student-run intervention in rural, northwestern Wisconsin. This intervention follows a four-step process: materials and methods, recruitment, publicity, and retention. Recommendations will be made to enhance employer outreach measures and future service provider/business partnerships.

## **SEARCHING FOR DISEASE RESISTANCE GENES FOR THE RICE BLAST FUNGUS**

Huong Pham, and Sally Leong (Mentor), Plant Pathology

*Magnaporthe oryzae*, the rice blast fungus, reduces the yield of rice in many countries where rice is a staple food. I am studying the role of RNA-dependent RNA polymerase in the host's defense mechanism against the fungus. This gene reduces infection of Arabidopsis by agrobacterium tumefaciens and viral infection in many plants. Recently, double-stranded RNA for defense genes was found during infection of rice by *M. oryzae*. From this gene, I will make miRNA (microRNA) that is complementary to the target gene's mRNA by expressing an artificial miRNA in rice leaves. miRNA will turn off the targeted gene. If more disease is present when the fungus is inoculated on these rice leaves, we can conclude that the target gene plays a role in disease resistance.

## **INVESTIGATING MECHANISMS OF HEART VALVE CALCIFICATION IN VALVULAR INTERSTITIAL CELLS**

Laura Piechura, and Kristyn Masters (Mentor), Biomedical Engineering

Calcification of valvular interstitial cells (VICs) is the leading cause of failure in both native valves and bioprosthetic valve replacements. It has been found both *in vivo* and *in vitro* that alteration to the extracellular matrix (ECM) environment and the activity of certain growth factors are associated with calcification. However, a link between ECM remodeling and pro-calcific growth factor activity remains unexplored. Given recent findings, we hypothesize that the ECM alteration associated with valvular dysfunction is mediated by pro-calcific growth factor activity. This correlation will be investigated in the 2-D environment of VIC cultures through exogenous treatment with pro-calcific growth factors and subsequent analysis of ECM remodeling. Results from the proposed research will provide further understanding of the mechanisms underlying valvular disease.

## **UTA PRESENTS *BRING ME TO LIGHT***

Alan Piotrowicz, and Renee Alfano (Mentor), Student Organization Office

The Undergraduate Theatre Association (UTA) proudly presents its second annual musical revue, *Bring Me to Light*. Charlie Bauer returns to create and direct this new work featuring songs from contemporary musicals including *Moulin Rouge*, *The Full Monty*, *Songs For A New World*, *The Wedding Singer*, *Spring Awakening*, *Violet*, *The Wild Party*, *See What I Wanna See*, *Sweet Charity*, *March of the Falsettos*, *Avenue Q*, *De-Lovely*, *You're A Good Man Charlie Brown*, *Anyone Can Whistle*, *My Fair Lady*, *The Secret Garden*, *City of Angels*, *Dirty Rotten Scoundrels*, *Little Shop of Horrors*, and *The Light In The Piazza*. UTA has been granted exclusive rights by the composers to use these songs for this production only. The show will feature a talented all-student, 25-person cast and live band for accompaniment.

## **EFFECTS OF IRON DEFICIENCY AND ERYTHROPOIETIN ON TRANSFERRIN RECEPTOR CONCENTRATION IN RAT DUODENUM**

Christa Pittner, and Pamela Kling (Mentor), Pediatrics

Iron is critical in cell proliferation in early life. Erythropoietin (Epo), found in human milk, stimulates iron utilization, but its role in iron absorption is unclear. We hypothesized that expression of duodenal iron transporter, TfR, would be higher in damfed or rats with iron deficiency anemia (IDA) fed enteral Epo from postnatal day 4–12, compared to control. Duodenum and liver slides were stained for iron and duodenal TfR immunohistochemistry was performed. Body or liver iron content was measured. TfR density was higher in IDA, compared to DF ( $p=0.05$ ). Liver iron content was greater in IDA and IDA+Epo than Dam or Dam+Epo,  $p<0.0005$ , but liver Prussian blue staining was lower in IDA and IDA+Epo, compared to Dam or Dam+Epo ( $p<0.0001$ ). These data support increased TfR density with iron deficiency, but no appreciable effect with Epo.

## **THE HARD FACTS BEHIND SOFT DRINKS**

Seve Ponce de Leon, and Jack Kloppenburg (Mentor), Rural Sociology

In today's interdependent global economy, the origin and production of our food and beverages remain a complete mystery for many of us. The truth is, there is nothing more important than what we put into our bodies, for it is from food and beverages that we acquire the energy and nutrients necessary for life. And yet soft drinks, which provide little nutritional value, are the single largest source of calories in the American diet. This photographic series

offers an unabashed glimpse of what goes into a bottle of soda, and what it means for our bodies, our communities and the environment. Discover some of the main ingredients found in this seemingly innocuous beverage and trace the impact of the bottle itself to its final destination.

## **MATERNAL AGGRESSION AND BEHAVIORS OF DAMS STRESSED IN UTERO**

Derek Powell, and Stephen Gammie (Mentor), Zoology

Stress, specifically during pregnancy, has been well documented in affecting not only a mother's maternal behaviors, but also the future behaviors of her offspring. During adolescence, and into adulthood, physical, hormonal, and behavioral differences attest to the modified stress response of the offspring. In this study I observed the maternal behaviors, including maternal defense, of female mice born from dams receiving chronic variably stress (CVS) during their pregnancy. Although dams have been shown to exhibit altered maternal behavior after being stressed in utero, to date no work has been done to differentiate the effects (on offspring) of prenatal stress versus effects of being raised by a prenatally stressed mom. To differentiate between the two I employed cross fostering of pups between CVS and non-stressed dams.

## **BEYOND SURVIVAL: FOOD EXPERIENCES IN MARY ROWLANDSON'S CAPTIVITY NARRATIVE**

Amy Powis, and Birgit Rassmussen (Mentor), English

This project examines Mary Rowlandson, the author of her foundational captivity narrative, *The Sovereignty and Goodness of God*, and her relationship to food. Using those experiences with food, Mary is able to understand her surroundings in captivity and also her position within those surroundings. Personal relationships with her captors, the relationship of the Puritans to the Narragansett tribe of Native Americans, and Mary's own feelings about her identity as a Puritan woman are illustrated by food language. Through food, Mary takes a journey in which she descends into the depths of the wilderness while simultaneously moving away from her native Puritan practices. Mary completely relies on food to portray her captivity experience showing how imperative a tool it was to her.

## **REDOX EFFECTS OF SELENIUM IN PROSTATE CANCER CHEMOPREVENTION**

Courtney Premer, and Terry Oberley (Mentor),  
Pathology and Laboratory Medicine

This study examines the effects of selenium at a dose of 5ppm (5 parts per million). Selenium is an important trace mineral whose antioxidant properties help prevent cellular damage from oxygen free radicals, which are natural by-products of oxygen metabolism. Liver tissue is sectioned and then stained with specific antibody to oxidized lipid-protein adducts (4-hydroxy-2-nonenol protein adduct) followed by immunogold-conjugated secondary antibody. Gold bead labeling is then analyzed in the electron microscope. Counting the amount of beads present in each of the cells—comparing the quantity found in the nucleus to the quantity present in the cytoplasm—illustrates where binding occurred. Results will demonstrate the effectiveness of selenium on modulating levels of free radicals produced by reactive oxygen. Further research testing different dosages of selenium will be crucial in determining the maximum effective dose that can be utilized as a preventative for prostate cancer.

## **PROVIDING INTEROPERABILITY WITH RECENT ADVANCES IN THEATRICAL LIGHTING AND CONTROL SYSTEMS**

Eric Proce, and Ann Archbold (Mentor), Theatre and Drama

Theatrical technology does not always change as rapidly as the world around it. A new standard, Architecture for Control Networks (ACN), based on prevalent computer network technology, offers a leap forward in flexibility and capability of theatrical lighting/control systems. This project aims to bridge the gap between the old standard, Digital Multiplexing (DMX), and the new standard, ACN, by implementing the draft standard DMX Streaming Protocol (DSP). DSP provides interoperability between old DMX systems and new ACN systems and introduces some of ACN's advantages to DMX systems. To accomplish this, we have created a proof-of-concept client/server application that implements DSP. This application is a practical demonstration of the power and capabilities of both DSP and ACN, which will help revolutionize theater technology.

## **MAMI WATA AND LA SIRÈNE: THE GODDESS' PLACE IN ZAIRIAN AND HAITIAN POPULAR CULTURE**

Yolanda Purdy, and James Sweet (Mentor), History

This project analyzes the figures of La Sirène and Mami Wata, goddess mermaids, in Haiti and Zaire during the presidency of François 'Papa Doc' Duvalier and Mobutu Sese Seko. These twentieth century presidencies were marked by fiscal corruption, mass pauperization of the population, while armies coerced, beat, and killed any questionable opposition. I argue that through artistic and religious expression, the people of these countries looked to the goddess to comment on these governments and to provide resistance. I will use artwork, interviews with artists and expatriates, ethnographies, novels of Haitian and Zairian writers of the period, political culture, and U.S. immigration statistics for the Haitian boat people. This research adds to the cultural comparison of the figure in African and African Diaspora studies.

## **PREVENTION OF TYPE 1 DIABETES IN THE NOD MOUSE USING A VITAMIN D ANALOG**

Muthukumar Ramanathan, and Jamie Nehring (Mentor), Biochemistry

Type 1 Diabetes Mellitus (T1DM) is an autoimmune disease that permanently destroys beta islet cells, leading to loss of insulin production and inability to regulate blood glucose levels. Approximately 1 in 800 Americans suffer from T1DM. Non Obese Diabetic (NOD) mice resemble the human pathogenesis of T1DM. 1,25-Dihydroxyvitamin D<sub>3</sub> (1,25 OH<sub>2</sub> D<sub>3</sub>), the biologically active form of vitamin D, has been shown to protect female NOD mice from developing T1DM. However, the high dosage of 1,25 OH<sub>2</sub> D<sub>3</sub> (50ng/mouse/day) causes a significant rise in serum calcium levels (hypercalcemia) in the mice. This study aims to identify a vitamin D analog at a dose that completely protects NOD mice from T1DM without inducing hypercalcemia.

## **UNIFYING AND STRENGTHENING AMERICAN INDIAN STUDENTS AT UW–MADISON**

Jonathan Rath, and Ned Blackhawk (Mentor), History

At the University of Wisconsin–Madison several American Indian student organization are in danger of losing their spaces on campus. This problem is a result of incessant zoning issues and building projects throughout campus. To avoid future hassles for the American Indian student community, we have established a horizontal axis of power to advocate a central activity center, union, or house for all the American Indian student organizations to share. So far on this axis of power we have faculty members, staff members, and members the American Indian student organizations, particularly Wunk Sheek. The newest component of this campaign however, is a student involvement in the Associated Students of Madison (ASM), the student government of UW–Madison.

## **THE ROLE OF HYPERSPECTRAL PHOTONICS IN COMBUSTION ENGINE EFFICIENCY**

Brian Ray, and Scott Sanders (Mentor), Mechanical Engineering

With the recent surging of the ‘Green’ movement and the outcry over rising gas prices in America, examining methods by which to improve the combustion process in engines has become necessary. A more efficient engine would produce less pollution and use less fuel than current engines. The utilization of hyperspectral photonics can lead to the development of engines that burn fuel more completely, ergo more efficiently. By directing lasers into the combustion chambers of engines, and then examining the properties of the laser, information such as the  $H_2O$  mole fraction, and gas temperature at the point of combustion can be determined. This information can then be passed on to manufacturers, such as Honda, who can fine tune the combustion process in their engines.

## **HOW DOES EXECUTIVE COMPENSATION AFFECT RISK-TAKING DECISIONS AND SHAREHOLDER'S RETURN?**

Varun Razdan, and Cynthia Devers (Mentor), School of Business

One of the most important issues in corporate governance is aligning executives' interests (who are considered risk averse) with shareholders interests (who are considered risk neutral). Currently, companies use incentives (e.g., stock options) as a means to bring these interests closer. Our study takes a quantitative approach to examine how these incentives influence executives' risk-taking decisions and, in turn, how these decisions effect shareholder return. Specifically, we examine the effect of incentives on the riskiness of pharmaceutical company executives' drug portfolio structuring decisions (the number of drugs and their relatedness in each phase of FDA testing) Preliminary results show that, contrary to popular belief, awarding executives more stock options does not increase shareholder return and, thus, does not appear to align executive and shareholder interests.

## **INTERNATIONAL EXPERIENCES IN A CHANGING WORLD**

Molly Reddy, Meagan Stilp, and  
Renee Alfano (Mentor), Student Organization Office

Student representatives Meagan Stilp and Molly Reddy, from AIESEC, will be presenting a video that is a collection of stories from students who have interned abroad through AIESEC. The video will showcase the importance and benefits of an international experience as an integral part of the college education. The presentation will also detail opportunities to get involved with AIESEC, an organization that is providing a way for students to create impact on global issues in a world where international cooperation is becoming increasingly important.

## **MILTON AND THE SELF: SUBJECTIVITY IN *PARADISE LOST***

Nicholas Rego, and Mario Ortiz-Robles (Mentor), English

This project examines the formation of selfhood in John Milton's *Paradise Lost* using modern theoretical models of social organization and control. The majority of prior analysis of the work is historicist, examining Milton's societal, political, and religious contexts to better understand the text. I approached the material through the theories of Foucault, Althusser, Benveniste, and others, aiming to remove the text from its historical context and draw new conclusions based on objective analysis of its characters and their development as such. This research highlighted the fundamental change prompted by the Fall of Adam and Eve which enables the application and effective function of mechanisms like discipline. The applicability of these models problematizes the ultimate goal of religion: is it to save or to subjugate?

## **THE INTERACTION OF TAT BINDING PROTEIN 1 AND THYROID HORMONE RECEPTOR**

Meghan Reppen, and Eugene Kaji (Mentor), Medicine

A yeast-2 hybrid screen was done using the DNA binding domain of thyroid hormone receptor  $\alpha$  (TR- $\alpha$ ). There were a number of interacting molecules found, one of which was sequenced and identified as tat binding protein 1 (TBP-1). The physiological effect of TBP-1 on cardiac hypertrophy is unknown and this study aims to determine the effect of TBP-1 on the activity of TR- $\alpha$ , which is known to increase the amount of physiological hypertrophy. A transfection and luciferase assay were used, with and without the presence of TBP-1, to test if TBP-1 is involved in the process of physiological hypertrophy. Based on previous results using other molecules, it is expected that the presence of TBP-1 will repress the activity of TR- $\alpha$ .

## **PEER SEXUAL HARASSMENT VICTIMIZATION, EATING DISORDERS, AND QUALITY OF MOTHER-DAUGHTER RELATIONSHIPS**

Amanda Riek, and Janet Hyde (Mentor), Psychology

Approximately 80 percent of middle and high school students have experienced peer sexual harassment victimization (PSHV). According to the vulnerability-stress model, one consequence of PSHV is symptoms of eating disorders (ED), although strong mother-child relationships may buf-

fer these effects. Two hundred mother-daughter dyads from the longitudinal Wisconsin Study of Families and Work completed measures of PSHV, mother-daughter relationships, and symptoms of ED. It was hypothesized that if symptoms of ED were a consequence of PSHV, strong mother-daughter relationships would buffer girls who experienced PSHV from such symptoms. Research findings hold significant implications for school counseling, family relationships, and state and federal legislation.

## **THE PRIVATIZATION OF SECURITY AND HUMAN RIGHTS IN THE AMERICAS**

Dario Rodriguez, and Katherine McCoy (Mentor), Sociology

Over the past several decades, private military companies (PMCs) have grown exponentially. Because of the lack of laws governing PMCs there have been massive abuses of power by these organizations. Currently data is very sparse and hard to come by concerning PMCs; if there is any information, it is usually biased or tainted. Our research involves compiling data, conducting and transcribing interviews and analyzing charts and data. Our goal is to bring more attention to the issue of PMCs abuses of power and encourage more stringent laws to regulate these organizations.

## **A SEASONAL STUDY OF BIOCHEMICAL OXYGEN DEMAND IN WILLOW CREEK AS AN INDICATION OF WATER QUALITY**

Emily Roth, and Janet Batzli (Mentor), Biology Core Curriculum

Dissolved oxygen (DO) and biochemical oxygen demand (BOD) help characterize the health of urban streams. A seasonal study conducted in Willow Creek on UW–Madison campus in 2006 measured very low DO ( $4.3 \pm 1.19$  mg/L) during weekly measurements (May to October). In addition, higher BOD in upstream versus downstream water was counter to predictions of higher microbial activity downstream. In 2007 an expanded study included carbonaceous biochemical oxygen demand (CBOD), nitrates and sterilized BOD to investigate the role of nitrifying bacteria. Similarities between upstream and downstream BOD, CBOD and nitrates suggest that nitrification does not contribute greatly to differences in BOD in Willow Creek. In sterilized samples, upstream BOD was greater than downstream suggesting an abiotic pollutant may be accounting for the high BOD upstream.

## **COMMUNICATION AND CONFLICT IN FAMILY BUSINESS BETWEEN FIRST AND SECOND GENERATION FAMILY MEMBERS**

Sophie Rupp, and Ann Kinkade (Mentor), General Business

The purpose of this research is to identify how different communication styles give rise to conflict between first and second generation family members. Statistics show that only 30 percent of those family businesses that survive their first five years of operation are successfully passed on to second generation family members. A lack of effective communication is a contributing factor to these failures. Drawing upon my first-hand experience as a second generation (future) successor to my family business, researching various family business journals and published research, and interviewing with an expert in the field of family business communication has helped me to identify ways in which communication can be made more effective between first and second generation family members. These findings suggest strategies that will help an individual to adapt their communication style to that of others,' leading to a more proactive and healthy relationship with their counterpart(s), as well as a more personally and professionally successful family business.

## **SIBLING START-UPS: CREATING A BUSINESS WHILE PRESERVING THE RELATIONSHIP**

Katharine Sappey, and Ann Kinkade (Mentor), General Business

The purpose of this project is to identify how siblings can successfully co-manage a company that they created themselves. Many second generation siblings that co-manage have been studied. Unfortunately, there has been minimal research done on first generation sibling start-up companies. This project will look at possible areas of conflict within the organization due to the joint sibling leadership and entrepreneurship, as well as approaches to manage conflict. In order to find ways siblings can successfully start a business, this project analyzes successful sibling teams in literature, as well as an actual case study. Through research and observation, core policies will be discovered that aid in the success of current sibling pairs running their own businesses.

## **INVESTIGATION OF NEW NUMERICAL METHODS FOR MOLECULAR DYNAMICS SIMULATION**

Nicholas Schafer, and Dan Negrut (Mentor), Mechanical Engineering

Molecular dynamics (MD) is an atomistic simulation technique that can be used to calculate properties of a material by measuring them as the system evolves in time. The system is evolved in time by calculating the forces on individual atoms and solving Newton's equations of motion at each time step. The numerical methods currently employed by MD simulation are only stable under short time steps. As a result, the forces between atoms must be calculated many times even for short simulations, greatly increasing the CPU time required. We are currently investigating the usefulness of implicit methods developed in the realm of classical mechanical system simulation for use in both biological and material science applications of MD.

## **GETTING PERSONAL**

Kelly Schlicht, and James Baughman (Mentor), Journalism

"Person to Person" debuted in 1953, breaking into new realms in the public persona of its host, veteran reporter Edward R. Murrow. Murrow himself implied he did "Person to Person" as a burdened favor for CBS executives. Yet, Murrow contradicted himself, showing real joy in particular shows, and disdain in others. Certain interviews with Lauren Bacall, Bette Davis, Marilyn Monroe and Sophia Loren, provide a view into Murrow's humanity through his rather obvious biases toward his female guests. Though one views Murrow in black and white on the television screen, we must remember that Murrow was not a black-and-white, two-dimensional figure; and, though certainly the most influential human being in broadcasting history, one must remember that Edward R. Murrow was simply human.

## **SCREENING OF *S. SUIIS* ISOLATES BY PCR FOR THE PRESENCE OF PAI ASSOCIATED WITH HIGH VIRULENCE**

Sarah Schmid, and Ogi Okwumabua (Mentor), Pathobiological Sciences

In 2005, a bacterial outbreak swept across Sichuan, China, killing 219 pigs and 38 humans. This outbreak was caused by a highly invasive strain of *Streptococcus suis* (strain 05ZYH33) associated with deep-tissue infection and streptococcal toxic shock syndrome (STSS). Comparative genomics studies of the strain revealed the presence of a pathogenicity island (PAI) that has been divided into three distinct regions. To determine if this outbreak strain is circulating in North America, we used three different PCR primer-pairs based on the nucleotide sequences of the three regions of strain 05ZYH33 PAI gene to screen 299 North American strains collected from various geographic regions. One primer set detected the 5' region of the PAI of the Chinese strain in 50 (17%) of the strains and the second set detected the 3' region of the gene in 23 (8%) of the strains. The third primer pair that targeted the middle fragment produced a 716-bp amplicon with the Chinese outbreak strain but yielded negative results with the North American strains. These observations indicate that the North American strains tested are different from the Chinese outbreak strain and suggest that the set of primers used in this study may be useful for active surveillance to monitor spread of the highly invasive *S. suis* strain.

## **SMALL MOLECULE REGULATORS OF EXOCYTOSIS**

Jennifer Schramm, and Stephen Bruinsma (Mentor), Biochemistry

Exocytosis is a common process by which cells release molecules (e.g. proteins) into the extracellular space. Calcium-regulated exocytosis is a mode of exocytosis found in neurons and other cells of which malfunctions are responsible for diseases such as asthma, diabetes, and cystic fibrosis. Not many drugs are available to treat these malfunctions, but it is thought that mass screening of small molecules could help identify one. By using high throughput assays we hope to find a small molecule that could be used to inhibit or enhance exocytosis.

## **SIBLING MICROCHIMERISM**

Steven Schumacher, and Partha Dutta (Mentor),  
Animal Health and Biomedical Sciences

Sibling microchimerism occurs when a mouse receives cells from its siblings through the placenta of the mother and the cells are adapted into the mouse's body. I hypothesize that, with a higher level of sibling microchime-

rism, acceptance of an allograft will be more likely. I will breed two mice (B6 mother-BDF1 father), and analyze H2b offspring for sibling microchimerism using PCR. If a high level of sibling microchimerism results, I will further analyze other individuals for tolerance of an allograft. If a low level of sibling microchimerism results, I will research other factors that affect allograft acceptance. Further research in this area will lead to people becoming able to accept transplantations from people of different HLA-types.

## **PHYSIOLOGICAL ROLE OF MUC 16 IN OVARIAN CANCER**

Tanjina Shabu, and Manish Patankar (Mentor), Obstetrics and Gynecology

Ovarian cancer is the most common cause of death from gynecologic malignancy and it is the fifth leading cause of cancer related death. A majority of the ovarian tumors overexpress the high molecular weight mucin MUC16. The main objective of the research project is to perform biochemical characterization of MUC16 isolated from the harvest media of cultured ovarian cancer cells, OVCAR-3, and from the peritoneal effusions of ovarian cancer patients. MUC16 from these sources will be isolated by column chromatography and analyzed by Western blotting and mass spectrometric methods. Basic molecular characteristics, including molecular size, glycosylation, and peptide structure of MUC16 will be analyzed. The results obtained from these experiments will help us understand the physiological role of MUC16.

## **FUNCTION VERSUS COMPOSITION: A NOVEL METHOD FOR CHARACTERIZING BACTERIAL COMMUNITIES**

Ashley Shade, Georgia Wolfe, and Katherine McMahon (Mentor),  
Civil and Environmental Engineering

Bacteria and the biogeochemical cycles they facilitate are the foundation of the living world, so imperative that ecosystems would collapse without them. Because of this, a thorough understanding of bacterial communities in the environment has interdisciplinary merit. Many studies of bacteria in the environment fingerprint the community by DNA methods. This gives a representation of the populations present, but does not differentiate between actively growing cells and quiescent or dead ones. Though DNA techniques are prevalent, a fundamental unknown is whether a DNA fingerprint misrepresents the functional fraction of the community. To address this issue we are developing a novel method of pre-rRNA analysis that targets the newly transcribed polycistronic rRNA operon, thereby only including bacteria that are actively growing and synthesizing ribosomes.

## **QUORUM SENSING AND MORPHOLOGICAL TRANSITIONS IN THE FILAMENTOUS FUNGUS ASPERGILLUS FLAVUS**

William Sharpee, and Nancy Keller (Mentor), Plant Pathology

Quorum sensing is a communication method by which a diffusible molecule acts to affect the collective behavior of bacteria within a population. While it was previously thought that quorum sensing only existed in prokaryotes, more recent data has shown it exists in eukaryotes and governs the yeast-to-hyphal growth of *Candida albicans*, a fungal pathogen of humans. Here we address the hypothesis that a class of oxygenated fatty acids called oxylipins are quorum sensing molecules affecting morphological transitions in the plant pathogen *Aspergillus flavus*. This hypothesis was developed based upon evidence that this fungus develops as sclerotia in low cell populations but as spores in high cell populations and that exogenous oxylipins alters spore and sclerotial ratios. Furthermore, deletion of oxylipin generating oxygenases alters spore-to-sclerotial transitions. By exposing new *A. flavus* cultures to spent medium from high cell densities, we will determine if quorum sensing is responsible for the observed modifications.

## **CASE STUDY: TWO CASE STUDIES OF FAMILY BUSINESS SUCCESSION**

Howie Shaw, and Ann Kinkade (Mentor), General Business

Only 30% of family owned businesses survive to the second generation, 12% to the third, and 4% to the fourth. These case studies will explore some of the potential reasons for why family businesses succeed or fail after successive generations. Emphasis will be placed on past approaches to transition of power. Through examination of past CEOs' methods of succession, the study aims to illustrate immediate and long-term effects on the company, the family, and the owners. Anticipated factors include sibling rivalry, effectiveness of communication, and ownership policies. An envelope manufacturing company in its second generation and an automotive additive company in its third generation will be used as the basis for this case study.

## **BLACK AND WHITE ISSUE? THE ROLES OF CONTROL AND MOTIVATION IN PERPETUATING PREJUDICE**

Laura Sheets, and Patricia Devine (Mentor), Psychology

Past research has demonstrated that individuals who control their behaviors in order to appear unprejudiced in an interracial interaction experience a decrease in their abilities to regulate their subsequent behaviors (Richeson & Shelton, 2003). However, no previous studies have examined consequences of such control efforts, so the current study is designed to fill this void. To this end, White participants interacted with a Black confederate. We expected that participants exercising a great deal of control over their behavior would rely more heavily on the Black stereotype in recalling the content of the interaction. This memory pattern would, in turn, confirm the stereotype for the individuals, perpetuating the cycle of needing to exercise control over behavior in future interactions.

## **THE EFFECTIVENESS OF AN HIV/AIDS CURRICULUM IN GRADE FOUR IN MOZAMBIQUE, AFRICA**

Kathryn Silberzahn, and Nancy Kendall (Mentor), Educational Policy Studies

The purpose of this research is to identify how effective a newly-developed grade four curriculum is in improving students' knowledge of HIV/AIDS and attitudes concerning risky behavior and relationships in Mozambique, Africa. Research activities include studying scholarly websites for background information regarding HIV/AIDS and school curricula in third world countries; collecting pre- and post-test data on curricular implementation and outcomes from fourth grade students in 30 schools in Southern Mozambique; data cleansing and coding; and data analysis and write-up. The research is not complete but our hypothesis is that, when appropriately implemented, the curriculum will increase the number of students from pre- to post-test who have a basic understanding of the HIV virus and its transmission and who display more negative attitudes toward engaging in risky behaviors or relationships. If these results occur, the curriculum offers a tool in the government's arsenal to slow the spread of HIV among young people in Mozambique.

## **IDENTIFYING BINDING PARTNERS FOR *DROSOPHILA* DGRI79**

Sona Son, and Christiane Wiese (Mentor), Biochemistry

The centrosome contributes essential functions to cell division by organizing the poles of the mitotic spindle. Disrupting centrosome number or function can result in human tumors. gamma-Tubulin is an important component in centrosome that acts as a microtubule nucleator. It forms a larger complex with several proteins that share two structural motifs. To gain a better understanding of the role of these motif, we are using yeast 2 hybrid to identify the binding partners for Dgrip79, a previously uncharacterized *Drosophila* protein that contains the motifs. Understanding Dgrip79 will contribute to our understanding of centrosome-mediated microtubule nucleation and facilitate development of new therapeutic strategies to treat human diseases caused by centrosome defects.

## **DANCESPORT TEAM (UW)—BALLROOM DANCING**

Liuyin Song, and Renee Alfano (Mentor), Student Organization Office

The DanceSport Team, founded in 2004, strives to promote and train students in ballroom dancing at the competitive level. As the interest in ballroom dancing has increased exponentially over the past few years, we provide a venue for students to discover the art of ballroom. Our mission is to produce outstanding ballroom dancers who are able to compete successfully at all levels from beginners to national champions alike, and with that better social and performance dancers. In addition to competitions, the team hosts a showcase every semester; our Spring 08 showcase will be on April 18, at the Great Hall, at 8 p.m. Today, team members will perform the select individual routines they have been developing all semester.

## **IMPACT OF HEART FAILURE MEDICATION OPTIMIZATION ON QUALITY OF LIFE**

Andrew Soo Hoo, and Mauricio Velez (Mentor), Medicine

Heart failure (HF) affects 5 million Americans. Quality of life (QoL) for HF patients is usually poor. Angiotensin converting enzyme inhibitors (ACEi) and beta-blockers (BB) improve QoL in these patients, but it is unknown if this effect is uniform across the dosing range. We hypothesize that ACEi and BB doses that approach treatment goals correlate with better QoL in

HF patients. This study will include the first 100 patients with systolic HF enrolled in the UW Heart Failure Study. ACEi and BB doses, and Minnesota Living with HF QoL scores were recorded at baseline and their relationship will be analyzed. The results of this study may increase patient motivation to optimize their HF treatment.

## **ASSESSING VARIOUS REPEATED READING TECHNIQUES**

Julie-Anne Spatz, and Kimber Malmgren (Mentor),  
Rehabilitation Psychology and Special Education

This project involves discovering the effectiveness of repeated reading techniques in improving oral reading fluency. Reading fluency is the ability to read quickly, accurately, and with proper expression. Eleven pre-approved elementary-age children were separated into two groups; half for a computer intervention and half for a human intervention. In both situations, a child is first monitored as they practice reading a level appropriate passage three times. Then, the student is timed for one minute and the number of words read and errors made are recorded. The expected results are that there will be an increase in the number of words read per minute. The project also hopes to conclude whether a computer or a person is more effective in improving oral reading fluency.

## **PROTEIN-DNA BINDING MOTIFS**

Sarah Springborn, and Sarah Cunningham (Mentor), Biophysics

My research involves analyzing and finding patterns amongst interactions between nucleic acids and various proteins. First, we found the best method for clustering the hydrogen bond networks of proteins that were bonded to DNA. We tested a few options, selected the best one and then used these clusters to evaluate the output of the program Gausster that created a prediction of how the protein and DNA will interact. We analyzed and compared the predictions. We transferred this method to the other nucleic acid, RNA. RNA is slightly different because it does not form a uniform double helix, but is a flexible strand. Thus, we are now altering the program so we can use the clustering test and be able to make successful predictions!

## **CRD-BP MRNA AS AN INDICATOR OF CANCER IN HUMANS**

Sarah Standish, and Jeff Ross (Mentor), Oncology

The goal of this project is to explore a blood test for early cancer detection. The target is mRNA encoding the protein CRD-BP, which is a cancer-causing protein linked to many types of human tumors. Detecting this mRNA in peripheral blood might provide an early indication of cancer. The technique involves extracting mRNA from blood serum and then detecting the CRD-BP mRNA using reverse transcription and polymerase chain reaction. While previous research has indicated high levels of CRD-BP expression in various human carcinomas, this research investigates whether the mRNA for the CRD-BP is present at detectable levels in the bloodstream. Preliminary tests using serum from patients with colorectal cancer have been promising.

## **TORTURED BY FASHION: REINTRODUCING A BRUTAL PAST TO A NEW GENERATION**

Kristina Stanek, and Ksenija Bilbija (Mentor), Spanish and Portuguese

This study examines shock advertisements that display violent images to sell apparel in post-dictatorship Latin American countries. Specifically, it analyzes a highly contested ad by Diesel Jeans printed in Argentina and a brochure for a jeans campaign from the Chilean department store Ripley. After examining the companies' marketing strategies and interviewing representatives from the ad agencies that created the pieces, it appears that the intention was not to offend their audience, but rather to grab their attention and leave a lasting impression. Furthermore, this study explains the difference that an audience's personal experience has on their interpretation of an ad, accounting for the extreme difference in the reactions that the customers targeted by these ads had versus those of other members of the population.

## **REDUCED FERTILITY IN CNGC2 PLANTS IS DUE TO A SPOROPHYTIC DEFECT**

Allison Strohm, and Patrick Krysan (Mentor), Horticulture

While cyclic nucleotide gated channels (CNGCs) are known to play an important role in sensory transduction in animals, little is known about their functions in plants. Arabidopsis plants carrying the *cngc2* mutation exhibit reduced size and fertility. These characteristics become more severe when the plants are treated with physiologically relevant levels of calcium. To

determine the cause of reduced fertility, we investigated pollination and fertilization in *cngc2* plants. These plants have shorter anthers and a fertilization defect. By genetic analysis, we conclude that this is a sporophytic rather than gametophytic defect. Pollen tubes grow poorly when wild type pollen comes in contact with *cngc2* stigmas.

## **PREDICTED NEUTRINO FLUXES IN THE ICECUBE NEUTRINO OBSERVATORY FROM COSMIC RAY SOURCES**

Grant Teply, and Francis Halzen (Mentor), Physics

Cosmic rays are energetic, charged particles of astronomical origin. Although discovered almost a century ago, the sources of cosmic rays remain unknown. Cosmic accelerators that produce cosmic rays also produce neutrinos. These neutrinos represent incontrovertible evidence of cosmic ray production because neutrinos can only be produced by cosmic rays in the source. Also, neutrinos are electrically neutral and point directly back to their sources. The IceCube Neutrino Observatory will reach the sensitivity to detect these neutrinos. At higher energies, fewer gamma rays are observed. As a result, the spectrum from a gamma ray-emitting source can under normal circumstances be parameterized as a power law of the energy, where the exponent is the spectral index. Theoretical models give a correlation between observed gamma ray and neutrino fluxes. With the assumption of a power law gamma spectrum, the corresponding rate of neutrinos to be observed in IceCube has been computed.

## **THE EFFECT OF WEATHER ON GROUND LEVEL OZONE AT COASTAL AND INLAND MIDWESTERN SITES**

Philip Thomas, and Tracey Holloway (Mentor), Nelson Institute/SAGE

Ground level ozone has been linked to decreased lung function and may cause respiratory ailments such as asthma and chronic obstructive pulmonary disease. Nearly all of the counties bordering Lake Michigan exceed the EPA's maximum 8 hour standards of .08 parts per million. The purpose of this research is to investigate the effect temperature, wind speed, and proximity to Lake Michigan have on ozone measurements at ten Midwestern sites. We chose a mix of urban, rural, coastal and inland sites in order to study these relationships. The results from this research will help us understand how weather has affected ozone levels throughout the Midwest in the past, and how proximity to Lake Michigan affects the weather-ozone relationship.

## **THE EFFECT OF TRENBOLONE ON FATHEAD MINNOW EMBRYONIC DEVELOPMENT**

Xuejiao Tian, and Terence Barry (Mentor), Animal Sciences

Most cattle in the U.S. are reared in concentrated animal feeding operations (CAFOs) and receive implants of trenbolone (TBN), a synthetic growth-promoting androgen. Recent studies show high levels of TBN in CAFO effluents. It was hypothesized that TBN disrupts normal embryonic development in the fathead minnow. Newly spawned eggs were cultured individually in 96-well plates and exposed to water containing 1% and 3% cattle CAFO effluent, or various doses (0.05 µg/mL, 0.5 µg/mL and 5.0 µg/mL) of pure TBN. CAFO effluent and TBN had significant impacts on fathead minnow development. In general, exposed fish showed delayed and abnormal embryonic development. Synthetic hormones associated with CAFO effluent may cause endocrine disruption in early life cycle stages of fish.

## **ADOLESCENTS' DECISION MAKING ABOUT DISCLOSURE TO PARENTS**

Jasmine Timmons, and Heather Von Bank (Mentor), Educational Psychology

For this study we conducted interviews with adolescents, ages 12–19, concerning how they make decisions about sharing or withholding information from their parents, about their life with peers. We also investigated adolescents' conceptions of parents' and peers' expectancies regarding disclosure. We expect to find that older adolescents use more sophisticated decision making strategies than younger participants. By identifying these strategies that adolescents use, we hope to better understand the communication patterns between parents and children.

## **SUPPORT FOR WOMEN'S HOCKEY ON UW-MADISON CAMPUS**

Pamela Touhey, and Ron Harris (Mentor), English

UW-Madison's women's hockey team has won back-to-back National Championships; so why don't more people support women's hockey? One possible explanation is the emergence of mass sports, which men used to regain masculinity and resist feminized society in Europe during mid-nineteenth and early twentieth centuries. Drawing on this historical explanation to understand hockey attendance at UW-Madison, I also present original research from: interviews with students with men's hockey tickets, content analysis of campus newspapers, and background reading into contemporary hockey organizations. From this mixed-method approach, I propose changes to the depiction of women's hockey and a new publicity campaign to target students who are already hockey fans. This research contributes to understanding of gender inequity in sports attendance and to a local effort in promoting women's hockey.

## **COPPER(II)-CATALYZED INTRAMOLECULAR C $\alpha$ H AMIDATION OF OXAZIRIDINES**

Amanda Turek, and Tehshik Yoon (Mentor), Chemistry

For years, synthetic organic chemists have attempted to develop methods for the oxidation of unactivated C $\alpha$ H bonds. Recent research in the Yoon group has found that conformationally restricted aliphatic oxaziridines undergo copper(II)-catalyzed intramolecular amidation selectively at the delta position. This method works well when the delta methylene unit is benzylic; however, extension of this method to less functionalized oxaziridines is highly desirable. This research aims to increase the efficiency this reaction class involving oxaziridines with non-benzylic delta methylenes by optimizing the catalyst loading.

## **MESENCHYMAL STEM CELL THERAPY AND ITS APPLICATION TO CEREBRAL ISCHEMIA**

Casmir Turnquist, and Mustafa Baskaya (Mentor), Neurological Surgery

Ischemic stroke is caused by a disturbance or blockage of a major vessel supplying blood to the brain. Neural cell death associated with ischemia can inhibit speech, movement and memory. Currently, no effective pharmacological treatments exist to repair the resulting damage. Stem cell treatments have the potential to repair the infarction region by regenerating nerve cells. In this study, mesenchymal stem cells (MSC), derived from human embryonic stem cells, are investigated as a treatment on post-ischemic rats. Ischemic stroke is induced in the rats by a middle cerebral artery occlusion followed by an injection of MSC through the femoral vein. Fluoresce staining on the post-ischemic rat brain slices revealed that the cells migrated to the damaged region, and further differentiated into astrocytes and neuron cells.

## **THE INFLUENCE OF PERCEIVED CONTROL OVER PAIN ON PAIN INTENSITY AND RESPONSE TO GUIDED IMAGERY**

Carissa Ubersox, and Kristine Kwekkeboom (Mentor), Nursing

Previous studies suggest that perceived control over pain has an important role in distress, functional status, pain tolerance, and quality-of-life. The purpose of this study was to explore the influence of perceived control over pain on pain intensity and response to guided imagery. Thirty-one hospitalized patients with cancer pain completed measures of perceived control over pain, pain intensity and pain-related distress before and after trials of guided imagery. Perceptions of pain were not related to pain intensity. There was a trend toward greater change in pain scores among persons with low compared to high perceptions of control. Findings suggest that assessing patients' perception of control over pain may be beneficial in identifying people who will benefit from guided imagery.

## **EFFECTS OF GUM CHEWING ON ENERGY INTAKE AND EXPENDITURE**

Pajin Ntaub Vang, and Leah Whigham (Mentor), Obstetrics and Gynecology

Previous short-term studies have shown that gum chewing reduced energy intake (EI) and increased energy expenditure (EE). This study investigates EE and EI over a longer period of six weeks. Seventeen overweight and obese (BMI 27–37) volunteers will be randomly assigned to the control

group (given advice on weight loss) and the intervention group (instructed to chew gum for 15 minutes at least six times daily). Body composition will be determined by air displacement plethysmography. EE will be determined by doubly labeled water. With these combined methods we will calculate average daily EI and thus objectively address the effect of gum chewing on EI without the bias accompanying self-reported intake. We hypothesize gum chewing will increase EE and decrease EI resulting in negative energy balance.

## **VALIDATION OF THE SOLID MODELING PROCESS: CREATING MODELS FROM CT DATA**

Ashish Verma, and Mariana Kersh (Mentor), Mechanical Engineering

The purpose of our research is to validate the geometry of the human knee. We will be comparing the human knee to the CT-scans when intact and when the human knee has been separated. The main focus is on the bones and the ligaments that connect the bones together. Since the geometries of a pig knee and a human knee are very similar and also easier to obtain, testing and validation of pig knees will be a more feasible choice. We will acquire MRI scans to create models that will be compared to laser scans of the separated parts of the pig knee. While comparing both geometries using Geo Magic and Mimics, we will hopefully get very similar models in terms of volume and surface area. The results of this experiment will get us one step closer to having a better model of the human knee that can be used in clinical applications such as orthopedic implant evaluation.

## **SEQUENCING AND SUBCLONING OF THE CHXE GENE IN A CARROT (*DAUCUS CAROTA*) BAC**

Eric Victor, and Philipp Simon (Mentor), Horticulture

CHXE is the gene that codes for the enzyme epsilon-ring hydroxylase that is needed to convert alpha-carotene into lutein. Previously the coding DNA (cDNA) sequence for the gene was determined and was used as a template to work on the genomic DNA (gDNA) sequence. The DNA used to determine the sequence was cloned from a Carrot *E. coli* bacterial artificial chromosome (BAC). CHXE was amplified using polymerase chain reaction on the clones and submitted to the UW Biotechnology Center for sequencing. The sequences were combined to develop the entire gDNA sequence of length 6020 base pairs (bp), which is larger than the cDNA length of 1803bp. This increased gDNA length is due to the 8 introns contained in the sequence. The sequence was then compared to other plants, such as grapes and tomatoes, and found to be the first complete gDNA sequence for CHXE in any plant.

## **THE INFRASTRUCTURE OF STEM CELL RESEARCH IN SINGAPORE**

Tuyetnga Vo, and Sanjay Jain (Mentor), Management and Human Resources

Stem cell science promises to be a revolutionary field due to its potential to cure life-threatening diseases such as diabetes, cancer, heart diseases, ect. Many countries are racing to develop an infrastructure to develop this science. Our larger project is to examine developments across various countries to create an institutional infrastructure to enable commercialization of this science, taking into account the technological, social, and ethical issues that are associated with the technology. My part is to compose an account of the development in Singapore over the past decade, by identifying the key actors and their actions, institutions that they've created, rules, regulations, and investments that they've put in place. Creating such infrastructure will allow this science to progress from the lab to actually curing patients.

## **ANGIOTENSIN II RECEPTOR LOCALIZATION IN RAT ADRENALS**

Justin Vrana, and Mark Brownfield (Mentor), Comparative Biosciences

Angiotensin II is a short peptide that is important to cardiovascular homeostasis due to its regulation of water and sodium balance and blood pressure. It facilitates water balance by acting as a dipsogen in the brain to induce drinking and sodium balance by regulating the secretion of aldosterone from the adrenal cortex, which acts on the kidney to retain sodium. In the adrenal medulla it releases the vasopressor hormones norepinephrine and epinephrine. Our goal is to determine the location of angiotensin II receptors in rat adrenal glands using immunofluorescence microscopy. It is known that subtypes IA, IB, and II exist in the adrenal cortex and that IA and II exist in the adrenal medulla, however, the location of the subtypes and their density within each zone of the adrenal cortex and medulla will increase our understanding of angiotensin's affect on the adrenal gland and thus, its affect on sodium retention, adrenal medullary mediated fight-or-flight response, and normal blood pressure or hypertension.

## **WRITING ETHICALLY**

Jerrod Walker, and Michael Bernard-Donals (Mentor), English

The most common complaint from graduate schools and employers alike is that college graduates cannot write. The root of this problem is that students are rarely, if ever, taught how to place real-world arguments into expository writing. *Writing Ethically* will be a book that seeks to solve this problem by presenting students with Toulmin's Model of Argument. It will be a book targeted to first and second year college students. The research which has gone into this project has been finding relevant articles that show how others understand and teach Toulmin's Model. As one of the few textbooks that strive to teach proper argument targeted to college students, it is hoped that students will learn how to better express their ideas and, most important, write.

## **EFFECT OF *IN VITRO* GEFITINIB TREATMENT ON MUTANT T790M EGF RECEPTOR ACTIVITY**

Ziyi Wang, and Paul Bertics (Mentor), Biomolecular Chemistry

The epidermal growth factor receptor is a receptor tyrosine kinase that is mis-regulated in numerous cancers, including non-small cell lung cancer. EGF receptor activation causes several downstream effects via the stimulation of signaling molecules such as ERK1, ERK2, and STAT3, resulting in cell proliferation, survival, and metastasis. Gefitinib is a drug that was developed to inhibit the EGF receptor kinase from binding ATP. Patients sensitive to Gefitinib harbor mutations in the tyrosine kinase domain of their EGF receptor, and continued treatments with Gefitinib often leads to the selection of a T790M amino acid substitution in the EGF receptor that renders these tumor cells resistant to the chemotherapy. The mechanism by which the T790M mutation alone causes Gefitinib insensitivity is not well understood. However, my work provides evidence supporting the hypothesis that the EGF receptor's T790M mutation alone is sufficient for Gefitinib resistance of the EGF receptor activity and its downstream pathways.

## **MULTIVALENT GLYCOMIMETIC INHIBITORS FOR PROBING THE FUNCTION OF DC-SIGN**

Kittikhun Wangkanont, and Laura Kiessling (Mentor), Chemistry

Dendritic cell-specific intercellular adhesion molecule-3 [ICAM-3]-grabbing non-integrin (DC-SIGN), a carbohydrate-binding protein on the surface of dendritic cells, plays a crucial role in antigen internalization and subsequent immune response. DC-SIGN is a receptor for various pathogens, including HIV and Mycobacterium tuberculosis, and has been shown to facilitate infection. Because the mechanisms by which DC-SIGN functions are unclear, potent inhibitors of DC-SIGN would be valuable tools to elucidate its function. Monovalent inhibitors have been generated that show moderate binding; however, glycan-protein interactions in biological systems are often multivalent. Accordingly, we have synthesized polymer-based multivalent inhibitors of DC-SIGN to generate increased binding affinity over monovalent inhibitors. The length and valency of the polymers were varied to study the effect of these properties on binding. These multivalent inhibitors are powerful tools to study the role of DC-SIGN in infection.

## **YOUNG CHILDREN'S ATTRIBUTIONS ABOUT NOVEL ACTIONS**

Shauna Weiskotten, and Charles Kalish (Mentor), Educational Psychology

Part of young children's challenge in learning appropriate behavior is distinguishing between optional and required actions. Existing research suggests young children may over-estimate constraints on social actions, tending to see external reasons such as rules or physical limitation as guiding others' actions rather than internal reasons such as preference. This exploratory study looks at attributions children make about novel actions. Children viewed two videos of different actors performing the same novel series of actions, then a third, of an actor omitting or modifying one of the actions. Surprisingly, young children did not make rule attributions but did make some attributions of preference. We expect that naming the actions in the first clip will elicit more rule attributions in the next phase of this study.

## **ANALYSIS OF ETS FACTOR EXPRESSION AND FUNCTION IN NEURAL CREST CELLS**

Joseph Wszalek, and Mary Halloran (Mentor), Zoology

Neural Crest cells (NCCs) are multipotent cells unique to vertebrates. Following their induction at the neural plate border, they undergo an epithelial to mesenchymal transition (EMT) and migrate throughout the body (Morales et al. 2005). NCCs express members of the ets (Erythrocyte Transformation Specific) family of transcription factors. Ets proteins mediate many different types of functions, including cell motility, growth and apoptosis (Oikawa and Yamada 2003). Furthermore, their expression has been observed in NCCs and other cells just prior to and during EMT. We examined the expression patterns of numerous zebrafish ets factors during early embryonic development. Furthermore, we examined the effects caused by the deletion of a specific ets factor ets1.

## **STRUCTURAL STUDIES OF *DEINOCOCCUS RADIO DURANS* RECOMBINASE D**

Sarah Wynn, and William Bement (Mentor), Zoology

*Deinococcus radiodurans* is an extremophilic bacterium that can withstand hundreds of double-strand DNA breaks and still repair its genome without mutation. The mechanisms behind this extraordinary DNA repair capacity remain largely unknown and are intriguing due to the lack of identifiable homologs for the recB and recC genes in the *D. radiodurans* genome. This omission is surprising, since the RecBCD complex in *E. coli* is responsible for almost all recombinational and double-strand DNA break repair. Interestingly, *D. radiodurans* does encode a homolog of the recD gene; however, little is known about the function of its protein product independent of RecB and RecC. The goal of my project is to solve the three-dimensional structure of RecD from *D. radiodurans* (DrRecD) using x-ray crystallography. We predict there will be important structural differences between the DrRecD and the well-defined *E. coli* RecD (EcRecD) protein based on available genetic and biochemical information. This will shed new light on the function of DrRecD in the robust repair mechanisms of *D. radiodurans*.

## **TOWARD SYSTEMATIC CLASSIFICATION OF GENETIC MUTATIONS IN *ARABIDOPSIS THALIANA***

Chen Xiyang, and Amir Assadi (Mentor), Mathematics

Gravity is a universal force that its presence has greatly influenced evolution of life on Earth. In plant biology, gravitropism refers to directed growth of a plant or plant organ (such as the root system) in response to gravity. Study of gravitropism has a rich and illustrious history, its modern study going back to Darwin. We provide a model to study gravitropism in the model plant *Arabidopsis thaliana*. We take the viewpoint that perturbation in the direction of gravity during growth of the plant root results in the perturbation of dynamics interactions among various physiological and molecular events such as growth of cells and flux of hormones due to kinetics in gene-protein networks. Turning this observation around, we design a mathematical approach to reverse engineering of changes in root growth morphology back to the genetic factors that are significant factors in root development, such as possible genetic mutations. The main tools are pattern recognition, statistical learning theory and differential geometry. The results in progress indicate that our method has great potential to detect mutation in the plant genome. The concrete outcome of this research will be in an intelligent system that classifies wild-type plants versus mutations. Understanding the process of growth and development of plants is an important scientific area of research and it is considered to play a key role in progress in agriculture, environmental engineering and food industries. Biologists believe that many discoveries about the model plant *Arabidopsis thaliana* will apply to understanding biology of other higher plants. Modern agriculture and genetic engineering depend on the fundamental research on the genetic biology of plants in order to grow better crop plants and more resilient plants. The results of this research contributes to discovery of function and the effect of genetic perturbations in growth processes of plants.

## **IDENTIFICATION OF CANDIDATE DISTAL-LESS TARGET GENES USING MICROARRAY EXPRESSION ANALYSIS**

Janie Yang, and Grace Boekhoff-Falk (Mentor), Anatomy

The homeodomain transcription factor distal-less (*dll*) has been well characterized for its roles in *Drosophila* appendage development. *dll* and its vertebrate homologs, the *Dlx* genes, are also expressed in the central and peripheral nervous systems, including the olfactory system. Studies in our lab showed mutation of *dll* disrupts the olfactory system development of the larval *Drosophila*. To gain insight into the *dll* mutant phenotypes, I am systematically identifying candidate *dll* target genes via microarray expression

analysis and validating these targets in vivo using fluorescent immunohistochemistry. By elucidating the genetic network regulated by *dll* in the developing *Drosophila* olfactory system, we anticipate gaining valuable insights into mechanisms of Dll/Dlx protein action that will significantly expand our knowledge of both invertebrate and vertebrate neural development.

## **FLAME TUBE**

Xao Yang, and Scott Sanders (Mentor), Mechanical Engineering

The Sanders group is currently working on building a laser to measure extreme gas temperatures around 2000 Celsius. To test the laser we are building a flame tube which will be connected to an air line, a methane source, and a burner. Other projects include finding materials that will be able to withstand extreme temperature conditions. Once these things are completed then a laser will be able to be sent through the flame and record temperatures of the different gas particles being heated by the flame. The Sanders group with this research intends to find out the behavior of water vapor at extreme temperatures which then can be applied to engine research.

## **TESTOSTERONE ADMINISTRATION IN POSTMENOPAUSAL WOMEN**

Hannah Yang, and Whitney Wharton (Mentor), Geriatrics

Women are diagnosed with Alzheimer's disease (AD) more than age-matched men. High testosterone levels are associated with lower incidents of AD. Testosterone has been added to hormone therapy (HT), which may explain HT users' cognitive improvements and decreased prevalence of AD. The current study examined the effects of differing testosterone levels on cognitive abilities in older women. Eighteen postmenopausal women participated in the randomized, double-blind study and administered half- or full-strength methyltestosterone. Outcome measures included visuospatial and verbal tasks. Women taking full-strength methyltestosterone outperformed those receiving lower testosterone concentrations on verbal and visuospatial tasks, two tasks associated with fluctuating androgen levels. HT regimens that incorporate testosterone may be superior to estradiol only formulations in regard to cognitive improvements and AD prevention.

## **CONVERGENT MEASUREMENT AND ABILITY MODELING OF ABSOLUTE PITCH PROCESSORS**

Nicholas D. Young, and Erin Jonaitis (Mentor), Psychology

Absolute Pitch (AP), also popularly known as ‘Perfect Pitch,’ is the ability to identify or produce a musical tone without any external reference. While previous studies have investigated AP by means of many cognitive, perceptual, and physiological batteries, the construct was never uniformly measured within the literature. My work seeks to characterize AP more fully by using past and novel measures, in order to understand how, and if, the varied methodology truly fits together. Experimental procedures include verbal and visual note identification (e.g. note-naming, western music notation) and production (e.g. humming/singing) across a wide range of frequencies and pitch types. By testing beginning to highly trained professional musicians, we will be able to see whether AP ability is on a continuum or if it is simply a rare, special talent.

## **A NEW LIGAND TO CATALYZE HYDROACYLATION**

Linda Youngwirth, and Clark Landis (Mentor), Chemistry

Hydroacylation is a transition metal catalyzed, carbon-carbon bond forming reaction in which an aldehyde and alkene are converted to a ketone. Previously, this reaction has been catalyzed by a transition metal phosphine complex with 2-amino-3-picoline as a cocatalyst. However, these catalysts are slow and require harsh conditions. In our experiments, a 3,4-diazaphospholane was reacted with various amines, via PyBop coupling, to yield a group of carboxamide derivatives. The amine functionality of these ligands will hopefully allow the hydroacylation reaction to be run without the cocatalyst. Two equivalents of the ligand were reacted with Rhodium (I) acetylacetonate dicarbonyl to give a metal complex. This complex will be tested as a catalyst for the reaction of benzaldehyde and hexene to yield heptanophenone, a ketone.

## **PROJECT TO CREATE A PLACE ONTOLOGY FOR WISCONSIN**

Lorenzo Zemella, and Nancy Wiegand (Mentor),  
Land Information and Computer Graphics Facility

This project is about designing a place ontology for the United States, mainly Wisconsin, with the objective to test more efficient methods of searching for geospatial data using direct associations with place. Investigating a more efficient method of organizing and compiling geospatial data is being done to allow more refined searching. Deciding on and organizing classes in the place ontology was surprisingly not as straightforward as expected. Also, programming relationships (object properties) between classes and instances has been challenging. The purpose of programming efficient and useful relationships is to improve and refine searching through large amounts of geospatial data using transitive and other relationships between places. Learning OWL code and Protégé, an ontology editor from Stanford, was required to do this research.

## **TOWARD THE OBSERVATION OF $0\beta\beta$ DECAY THROUGH A PRECISE CALIBRATION OF THE ENERGY SPECTRUM IN CUORE**

Dan Zou, and Karsten Heeger (Mentor), Physics

The Cryogenic Underground Observatory for Rare Events (CUORE) in Italy seeks to unravel the mystery of whether neutrinos are their own antiparticles by searching for neutrinoless double beta decay. If neutrinos are their own antiparticles, double beta decay can proceed without the emission of anti-neutrinos. The signature of this neutrinoless decay is a unique decay energy. A precise measurement of events with this decay energy will differentiate any actual neutrinoless double beta decays from backgrounds. This research attempts to optimize CUORE's energy spectrum calibration by use of more accurate peak fitting, examining regressions used to map raw data to energy, and improving automated calibration techniques, with the ultimate goal to reduce uncertainties in the neutrinoless double beta decay region of interest.



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