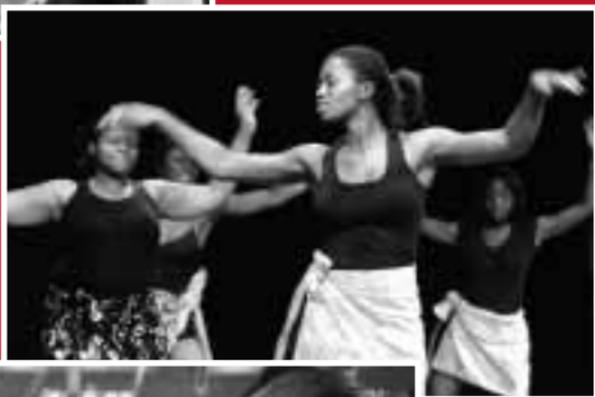


# UNDERGRADUATE SYMPOSIUM

ABSTRACTS  
2007



*Celebrating research,  
creative endeavor,  
and service-learning*



UNIVERSITY OF WISCONSIN—MADISON

# Undergraduate Symposium 2007

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

University of Wisconsin–Madison Memorial Union

April 12, 2007

- 9:45 a.m. Welcome to Student Participants  
by Vice Provost for Teaching and Learning  
Aaron Brower, Great Hall
- 10 a.m.–4 p.m. Posters and Displays, Great Hall

## **Oral Presentations and Poster Sessions**

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

- 10–11:30 a.m. Session I
- Noon–1:30 p.m. Session II
- 2–3:30 p.m. Session III

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; Andrea Benton and Melissa Tedrowe of the Writing Center; Ariane Strombom, Gwen Evans, Linda Kietzer, Jeff Jerred, and Kent Hamele at University Communications; Rob Lauer and Michael Comstock of the Division of Information Technology; David Luke at the College Library; Karen Lederer, Krisa Johnson, and Jan Lucchesi of the College of Letters & Science, Student Academic Affairs; and the team of students from the Accenture Leadership Center (Dennis Terry, mentor).

#### *2007 Undergraduate Symposium Organizing Committee:*

Lisa Bintrim (coordinator), Jane Harris Cramer, Maya Holtzman, Svetlana T. Karpe, Laurie Mayberry, Janice Rice, Julie Stubbs, Melissa Tedrowe, Randy Wallar.

*Cover photos by Jeff Miller and Michael Forster Rothbart, Office of University Communications*

# Undergraduate Symposium 2007

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

*University of Wisconsin–Madison  
April 12, 2007*

The ninth 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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*Center for Biology Education*

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*The Wisconsin Union*

*Undergraduate Academic Awards Office*

*Undergraduate Research Scholars Program*

*Writing Center*



## **DEMONSTRATION OF THE PROPERTIES OF D-GLUCOSE AND D-GLUCOSE TESTERS**

Nneka Akubeze, James Maynard (Mentor), Chemistry

The purpose of this study is to create a demonstration depicting the properties of D-Glucose. To show this, a blood sugar tester is used to test D-Glucose at different concentrations in order to make a calibration curve. Next, other sugars are tested. The tester will not show any readings because D-Glucose is the only sugar it reads. Then, Invertase is added to Sucrose producing D-Glucose and Fructose. Glucose Oxidase is added to D-Glucose producing Gluconolactone. These tests allow for the creation of a curve of the rate of decomposition or production of D-Glucose. From this, we can determine the rate law of these reactions. The findings of this study will be published in the *Journal of Chemical Education* and used to assist in teaching.

## **ANALYSIS OF ANTHROPOGENIC GREENHOUSE GAS CONTRIBUTIONS TO TEMPERATURE CHANGE AND ICE EXTENT**

Dominique Alhambra, Christine Kwitek, Jack Williams (Mentor),  
Geography

The early anthropogenic hypothesis suggests that human influence on climate may actually be thousands, not hundreds, of years old, and the glacial onset that should have occurred naturally has been delayed due to human contributions. Using climate modeling, we compared pre- and post-industrial greenhouse gas (GHG) levels to estimated natural levels. Our results showed that climate is highly sensitive to pre- and post-industrial anthropogenic GHG emissions, with a 1.98°C difference in global mean-annual temperature pre-industrially and an additional 2.95°C post-industrially. The total 4.93°C drop in global mean-annual temperature in absence of anthropogenic GHGs allowed for increased year-round ice coverage on Arctic Circle land masses and Antarctic sea ice. These results put our model close to a glacial-inception state, supporting the overdue-glaciation hypothesis.

**CLICK** for **INDEX** to locate abstracts by presenter

## **CO-SLEEPING WITH INFANTS BORN PRETERM OR LOW BIRTH WEIGHT: FAMILY CHARACTERISTICS AND CORRELATES**

Jamie Anschutz, Julie Poehlmann, Jenna Reetz, A.J. Schwichtenberg  
(Mentor), Human Development and Family Studies

Co-sleeping is an increasing practice in the United States; however, it continues to be controversial. The decision to co-sleep is often a cultural one and reflects parent, child, and family characteristics. Within this study, 99 preterm or low birth weight infants and their mothers were assessed at four months post-term. Measures included an interview detailing the infant's bedtime and night-waking routines, a maternal report infant sleep log, and an assessment of parent-child interaction quality—the Parent Child Early Relational Assessment (PCERA). Descriptive and correlational results describe the co-sleeping dyads in this sample and the associations among the PCERA, infant sleep parameters, and family co-sleeping practices. The discussion highlights cultural and practical components of co-sleeping in this high-risk sample.

## **LIGHT SENSITIVE HYDROGELS FOR LIGHT RESPONSIVE MICROLENSSES**

Alfredo Arteaga, Hongrui Jiang (Mentor), Electrical and Computer  
Engineering

This study seeks to make a tiny lens that can change its focal length from negative infinity to positive infinity by adapting to its environmental light. Existing microlenses need complicated external control; one of our goals is to produce a microlens that doesn't need such control. My hypothesis is that not only are we capable of making this light-responsive microlens, but we also are capable of making reconfigurable micro photonic devices that can help the world in the future. My experiments involve exposing the light of different wavelengths to the hydrogels, integrating the lens, and testing its focal length (measuring how strongly it bends the light). I conclude by saying that this microlens will be better than anything compared to it.

## **THE ALLIED UNITED FOR HEALTH PROJECT**

Kirsten Austad, Sean Spencer, Sharon Younkin & Byron Crouse  
(Mentors), Medicine and Public Health

We undertook a wellness initiative in which we addressed three community-identified concerns: dental health, nutrition/ physical fitness, and violence among youth. We set up various events to promote awareness of each of these issues. To address dental health, we hosted bi-weekly dental education and fluoride treatment sessions for an eight-week period. During this time, participants were presented with information regarding oral hygiene and received a fluoride application. Physical fitness and nutrition were addressed through weekly African dance classes led by UW students and a community dinner aimed to increase awareness of healthy eating. Conflict resolution will focus on using hip-hop to promote positive messages and healthy communication among youth.

## **SCREENING FOR SUPPRESSORS AND ENHANCERS OF CAR-1**

Dani Bachar, Jayne Squirrel (Mentor), Laboratory of Molecular Biology

A genetic screen for suppressors and enhancers of a particular mutant phenotype is an important method for learning about genetic pathways. One approach to such a screen is by RNA interference, which, in *Caenorhabditis elegans*, can be achieved by feeding worms with bacteria expressing dsRNA to a library of genes. I have set up an RNAi screen to look for suppressors and enhancers of the CAR-1 mutant phenotype. CAR-1 is important for cell division in the early embryo. Thus far, I have identified two enhancers of the CAR-1 mutant phenotype. The results presented are not only relevant to what is already known about CAR-1, but also may provide insight into the mechanisms of cell division.

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

David Baumann, Ei Terasawa (Mentor), Pediatrics

LHRH neurons control reproductive function. Rapid action of E2 on LHRH neurons was investigated. First, E2 application to LHRH neurons stimulated LHRH release within 10 minutes. Second, E2-induced LHRH increase occurred in the presence of tetrodotoxin (TTX), indicating that E2 affects LHRH neurons directly. Third, E2 conjugated with bovine serum albumin (E2-BSA) caused a similar effect as E2 alone, suggesting that E2 action occurs at the cell membrane level of LHRH neurons. Fourth, the E2-induced effects were not blocked by ICI 182,780, indicating that rapid action of E2 is mediated by neither E2 receptor alpha (ERa) nor E2 receptor beta (ERb). These results suggest rapid E2 action on LHRH neurons occurs at the membrane level by other than classical ERs.

## **PRESENCE OF ESTROGEN, PROGESTERONE, AND INSULIN GROWTH FACTOR RECEPTORS IN THE PEDIATRIC VOCAL FOLD**

Melissa Behrens, Susan Thibeault (Mentor), Surgery

Vocal fold development is dependent upon endocrine activity; however, little is known about hormone receptors in young larynges. Normal pediatric vocal folds (ages 0–24 months) underwent immunohistochemical staining for estrogen, progesterone, and insulin growth factor receptors. The aim of this study is to describe the presence and patterns of these receptors across early vocal fold development. Preliminary results indicate the presence of each receptor; however, the location and quantity varied among subjects. By exploring the presence of hormone receptors in the vocal folds across age, we can better understand voice development.

## **A DESCRIPTIVE STUDY OF JOB DESCRIPTIONS FOR CLINICAL NURSE SPECIALISTS IN ACUTE CARE SETTINGS**

Nicole Bennett, Julie Darmody, Karin Kunz, Mary Ellen Murray (Mentor),  
Nursing

A job description is an organizational tool that outlines the overall function, duties, and responsibilities of an employment position. My research purpose was to compare current themes for practice in the literature with the job descriptions of Clinical Nurse Specialists (RN with MS degree) in hospitals. Three researchers analyzed 10 job descriptions individually and then as a group. Job descriptions were evaluated for six literature-based themes, including framework, evidence-based practice, quality, safety, clinical outcomes, and fiscal outcomes. Preliminary results revealed no job descriptions utilized the current framework for practice. Quality was present in a majority of documents with greater variability noted in the presence of other themes. This variability may influence a lack of understanding about the activities and outcomes of Clinical Nurse Specialist practice.

## **CORRELATES OF NIGHT WAKING IN PRETERM OR LOW BIRTH WEIGHT INFANTS**

Shani Bensman, J. Poehlmann, A.J. Schwichtenberg (Mentor), Human  
Development and Family Studies

This study explored the relations between preterm or low birth weight infant sleep patterns and caregiver contact, prematurity, transitional object use, and breastfeeding. At hospital discharge, collaborating nurses completed a medical history form detailing infant health status, birth weight, and gestational age. At four months post-term, mothers completed a demographics form, an infant sleep log, and a short interview detailing infant sleep routines and practices. Results revealed that infants who used more objects during their transition to sleep tended to have less parental-reported night wakings, while infants who breastfed tended to have more parental-reported night wakings. Implications of these findings are discussed.

## **EFFICACY OF CURCUMIN IN COMBATING CANCER CACHEXIA**

Thomas Berg, Katrina Pycha, Donna McCarthy-Beckett (Mentor), Nursing

Cachexia, characterized by anorexia, weight loss, and muscle wasting, affects 75% of cancer patients and causes death in 40%. Evidence suggests cancer cachexia is an inflammatory condition. A dietary approach using botanical polyphenols with anti-inflammatory effects would be desirable due to the lower cost and fewer side effects for patients. The anti-inflammatory effects of curcumin are well characterized, though its effects on cancer cachexia is unknown. This study will use a mouse model of cancer cachexia in an experimental design to determine if a diet supplemented with 1% curcumin will preserve body weight and muscle mass in mice bearing the Lewis lung carcinoma tumor or the B16 melanoma. The findings from this study may yield exciting data relevant to nutrition decreasing the morbidity and mortality of cancer cachexia.

## **THE ACUTE METABOLIC AND PROLIFERATION EFFECTS OF NEUROPEPTIDES ON BOVINE ARTICULAR CARTILAGE**

Erik Bergersen, Lee Kaplan (Mentor), Orthopedics and Rehabilitation

This study examines the effects of Calcitonin Gene Related Peptide (CGRP), Neuropeptide Y (NPY), Substance P (SP), and Vasoactive Intestinal Peptide (VIP) on bovine articular cartilage chondrocyte growth and metabolism in vitro. Bovine articular chondrocytes were harvested, and cell proliferation and GAG production were assessed and analyzed. Since neuropeptides have a role in the development of cartilage in the embryo, it is hypothesized that neuropeptides will have an effect on the proliferation and metabolism of articular cartilage and can possibly hinder the degeneration of articular cartilage known as osteoarthritis. Preliminary results show dose-dependent changes in cell proliferation and GAG production, which support this hypothesis.

## **RED TOURISM: ATTEMPTING TO REKINDLE THE COMMUNIST SPIRIT**

Matt Beyer, Nicole Huang (Mentor), East Asian Languages and Literature

Red Tourism is a tourism phenomenon initiated and sponsored by the Chinese government based on the 70th anniversary of the Long March, a movement in which Communist forces trekked across China, gaining independence from the Nationalists and creating a legacy of liberation through revolution in its wake. Last summer, I went to dozens of China's revolution-focused Red Tourism sites, doing my own analysis of all available media and personal accounts surrounding Red Tourism to research its importance for today's China. My research and personal observations show that the Chinese government has used Red Tourism as a means of trying to preserve nationalistic and patriotic thoughts in a society losing its socialist, collectivist ideals and becoming more capitalist and individualistic.

## **CALCIUM DYNAMICS DURING CYTOKINESIS IN LIVING EMBRYOS**

Dominika Bienkowska, Jayne Squirrell (Mentor), Laboratory of Molecular  
Biology

Calcium, a ubiquitous signaling molecule mediates a wide range of cellular processes such as fertilization, cell motility, and cell growth. Calcium may also play a role in regulating cytokinesis. The endoplasmic reticulum (ER), which often surrounds mitotic spindles, may locally regulate calcium concentration, thereby influencing the stability of the microtubules (Kramer and Hawley, 2003). This hypothesis suggests that regional regulation of calcium levels may be important in cytokinesis. I am analyzing the localized changes in calcium level that occur during cell division in nematode embryos through the use of genetically encoded protein calcium sensors. Additionally, I will disrupt the calcium homeostasis in the embryos using pharmacological agents to evaluate the role of regulated calcium levels in cytokinesis.

## **HYBRID PULTRUDED PLANK WITH A CONCRETE COMPRESSION FLANGE FOR PEDESTRIAN BRIDGES**

Bryan Bindrich, Lawrence Bank (Mentor), Civil and Environmental Engineering

The goal of this study was to determine the feasibility of using a commercially produced, 2-inch-deep, fiber-reinforced polymer plank with a 0.75 x 1.0 inch cast-in-place concrete or cement board compression flange as a replacement for conventional timber 3' x 12' decking for pedestrian or light-weight vehicle bridges (snowmobiles or ATVs). A number of different specimens were fabricated and tested in three-point bending. Epoxy bonded, cast-in-place, and mechanically-fastened concrete and cement board compression flanges were investigated. The stiffness and strength of the hybrid deck panels were compared with that of a conventional 3' x 12' timber deck panel. Preliminary analysis reveals that the hybrid plank can lead to girder spacing of about 10% more than allowed with 3' x 12' timber planks.

## **THE ROLE OF VASCULAR REGRESSION ON CELL DEATH AND INTERDIGITAL TISSUE LOSS**

Laura Black, John Fallon (Mentor), Anatomy

During the development of amniotes, the forming digits (fingers and toes) are joined together by interdigital (ID) webbing. In free toed amniotes, such as humans and chickens, this webbing regresses by programmed cell death (PCD), or apoptosis. Regression of the ID blood vessels has also been observed during the stages when cell death is occurring. I sought to determine if changes in the ID vasculature correlated with PCD seen in chick embryos. I monitored vasculature regression by ink injection into the circulation, and PCD by molecular markers of cell death. I found that cell death occurs after ID vasculature regression, and my data provide evidence for two molecularly distinct regions of cell death in the chick foot.

## **MUIR WOODS MENTORS**

Mary Blitzer, Amy Blitzer, Jacob Cychosz, David Francis, Margaret Nellis (Mentor), Interdisciplinary Studies

Muir Woods Mentors is a dedicated group of University of Wisconsin–Madison students who propose to change the lives of children through an afterschool program fostering environmental stewardship. The goal of Muir Woods Mentors is to give children of diverse and disadvantaged backgrounds a chance to give back to their community. We introduce students to pragmatic conservationism while also empowering them to realize they can make a difference in the world around them. Children who get involved in science at an earlier age are more likely to enjoy it and pursue scientific careers. The relationships the elementary students form with their college mentors foster new or increased awareness of higher education, while giving the students a chance to develop intimacy with the natural world.

## **HYDROPHOBIC PROTEIN MATRICES FOR STABILIZING HEAT-LABILE PROTEINS**

Elizabeth Bobeck, Mark Cook (Mentor), Animal Sciences

Thermostability is essential before bioactive proteins can receive broad industrial uses. Encapsulation is the only viable technology for the stabilization of select proteins (e.g., antibodies). Polyclonal egg antibodies were used as a model system to devise new encapsulation matrices that would protect binding activity under steam conditions. It was found that if the protein was sequestered from water, binding activity could be maintained (100% activity after 60s at 93°C in steam). Hence, a hydrophobic protein matrix (HPM) was developed to prevent water contact with the antibody. After 60s at 93°C in steam, 42% antibody binding activity remained when in HPM as compared to 4% in the control matrix. These findings show that HPM is an effective method of providing thermostability to bioactive proteins.

## **EXPLORING THE ROLE OF CDC-42 IN THE ASYMMETRIC CELL DIVISION OF C. ELEGANS**

William Bothfeld, Kraig Kumfer (Mentor), Laboratory of Molecular  
Biology

CDC-42 is necessary for cell polarization and asymmetric cell division. While much is known about the signaling protein CDC-42, its role in asymmetric cell division remains unclear. We are using microscopy techniques to determine the location of fluorescent protein-tagged CDC-42 in the worm *C. elegans*. We are testing if the tagged protein is functional by determining if providing it to worms without CDC-42 eliminates their mutant phenotypes. We are using RNAi to rid mutant worms of mutant CDC-42, which prevents wild-type CDC-42's function in the gonad. This RNAi treatment increased reproduction rate and brood size. We expect this is a result of a reduction of a tumorous gonad phenotype. This treatment will allow characterization of what stage of gonad formation requires CDC-42 activity.

## **NURSES' EXPERIENCE DURING WITHDRAWAL OF LIFE SUPPORT IN THE ICU**

Gretchen Brabec, Emily Collins, Nathaniel Schwartz, Camilla Willett-  
Rabin, Karin Kirchhoff (Mentor), Nursing

About 20% of U.S. deaths occur in the intensive care unit (ICU), and most of those are preceded by withholding or withdrawing life support. Often physicians write orders for bedside nurses to perform withdrawal. There is little evidence of the training, specific practices, and support that nurses receive regarding the withdrawal of life support in ICUs. In response to this information gap, we have been developing a national survey, co-sponsored by the American Association of Critical Care Nurses, to assess nurses' experience of withdrawal of life support in the ICU. We expect nurses will report a wide variation in the amount of training and institutional support they receive. These findings may provide a foundation for future studies addressing what is needed to improve the current experience of ICU nurses.

## **CATEGORIZING PATIENTS' QUESTIONS AND THEIR REASONS FOR ASKING**

Zachary Brazgel, Betty Chewning (Mentor), Pharmacy

The primary purpose of this research is to investigate if patients use questions to express their preference passively. The secondary purpose is to develop a better understanding of what types of questions patients ask. Data is coded with a tool specified for categorizing patient questions. The investigator is coding an existing dataset of audio taped patient-physician encounters. The visits are between patients with rheumatoid arthritis and their rheumatologists. The product of this research is twofold: a typology of patient questions will be developed and quantitative analysis will examine patterns of why patients ask questions and how patients use questions to express their preference while making a decision with their doctor.

## **SEXUALITY EDUCATION IN AMERICAN PUBLIC SCHOOLS: (RE)THINKING GENDER, DISEASE, AND MORALITY**

Rachel Brooks, Carleen Ebert, Shauna Weiskotten, Nancy Kendall (Mentor), Educational Policy Studies

This case study of sex education programs in five diverse states exceeds previous studies by providing policymakers and the general public with ethnographic insight into how federal policies shape sex education curricula and how students, teachers, and parents make sense of different programs. The methods used include ethnographic approaches: participant observation, focus-group discussions, semi- and unstructured interviews, and document reviews. Major results indicate that 1) federal and state laws significantly shape sex education possibilities at the school level and promote privatization of sex education provision, 2) AOUM (abstinence only until marriage) sex education inscribes 'traditional' gender roles and heteronormativity, and 3) despite overwhelming parental support for comprehensive sex education (around 85%), AOUM sex education is less problematic to school districts due to superior organization of advocating institutions.

## **SEROTONIN-2C IN THE BRAIN'S APPETITIVE NEURAL PATHWAYS**

Samantha Brown, Mark Brownfield (Mentor), Comparative Biosciences

Since 1980, the prevalence of obesity in Americans has doubled. With this problem comes the need to develop pharmaceutical treatments that will aid in the treatment of obesity. Drugs that activate (agonists) serotonin 5HT-2c receptor central neural pathways suppress appetite. This project aims to locate where the drug acts on the rat's brain appetitive circuit and to determine the phenotype of the neurotransmitters involved. Accordingly, rats were injected with a 5HT-2c agonist, deeply anaesthetized, and perfused with fixative. The brain was sectioned into 50 micron sections, and, using immunocytochemistry, we localized nuclear cfos protein, an indicator of activation of neurons bearing 5HT-2c receptors or their downstream target neurons. Sections were then counterstained immunocytochemically, using a different color indicator, with other antisera to determine the phenotype.

## **WOMEN OF THE SCARRED EARTH: RISING TIDE HIP-HOP THEATRE AND SOCIAL MOVEMENTS**

Hannah Tien Buck, Katrina Flores, Nicole Soulier, Peggy Choy (Mentor),  
Kinesiology

Women of the Scarred Earth (WSE): Rising Tide student performance group uses theatre, hip-hop, spoken word, and dance to weave stories of social and environmental justice together to tell history. History is overwhelmingly told by those who win wars but WSE: Rising Tide seeks to create an environment for the personal to become political and for youth to become change agents by telling their own histories. The project has a strong outreach component and forwards the Wisconsin Idea through traveling across Wisconsin to high schools, community centers, and middle schools to perform and mentor students through dialogue after the performances. It is the student company's hope to reach youth across the state of Wisconsin by exposing them to innovative story telling, dance, and oral tradition movements and helping them use these survival strategies in coping with and healing our communities.

## **WHAT FACTORS INFLUENCE HEALTH? AGE DIFFERENCES IN THE OPINIONS OF WISCONSIN ADULTS**

Rodney Burayidi, Stephanie Robert (Mentor), School of Social Work

The goal of this project is to examine how Wisconsin adults view the factors that affect health, and to examine age differences in these views. We hypothesize that older adults are more likely than younger adults to say that social support is an important factor affecting health. Data are from a phone survey of 1,264 Wisconsin adults administered by the UW Survey Center between September 2006 and February 2007. We examine data from (1) an open-ended question asking about the top three factors that affect health, and (2) closed-ended questions that list possible factors affecting health and ask respondents to rate how important each factor is to health. The results of this study can inform policies on how to improve health for everyone.

## **CHILDREN OF INCARCERATED PARENTS: REASONS FOR TERMINATION OF MENTORING RELATIONSHIPS**

Kirby Burkett, Ashley Hanneman, Rebecca Shlafer (Mentor), Human Development and Family Studies

This study will examine match attrition and reasons for termination in a sample of 50 mentoring matches for children between the ages of 4 and 16 years with incarcerated parents. The study reported here is part of a larger evaluation of Mentoring Connections, a Department of Health and Human Services–funded mentoring program for children of incarcerated parents that works in partnership with Big Brothers/Big Sisters. Data were collected and analyzed from monthly phone interviews, initial and biannual face-to-face interviews, and termination interviews with children, caregivers, and mentors. The study hopes to see what factors contribute to match termination. In doing so, the current study seeks to understand more about the efficacy of mentoring high-risk populations like children of incarcerated parents.

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

Rogério Cardoso, Kristen Jones, Allison Noble, Peter Timbie (Mentor),  
Physics

We are building three small radio telescopes, based on the designs of MIT's Haystack Observatory, in order to develop and test new techniques for interferometry. An interferometer is an array of telescopes that combines signals to generate a higher resolution image than a single, smaller antenna can create by itself. We will build and compare an "adding interferometer" with a "multiplying interferometer." To date, we have erected the first telescope on the roof of Chamberlin Hall and are currently using the sun as a means to analyze the beam pattern. The telescopes will also be used to investigate and map the 21-centimeter line produced by neutral hydrogen (HI) in the galaxy.

## **THE FUNCTION OF THE SEN1-SMD3 INTERACTION IN SACCHAROMYCES CEREVISIAE**

Christian Carstensen, Michael Culbertson (Mentor), Genetics

Proper maturation of small nuclear RNAs (snRNAs) lead to functional spliceosomes. U1, U2, U4, U5, and U6 snRNAs along with more than 50 proteins make up the spliceosome in *Saccharomyces cerevisiae* (Staley et al., 1998). SEN1, a RNA/DNA helicase, and Smd3 are two genes that function in the maturation of U5 snRNA. I will be examining the effects of the Sen1p-Smd3p interaction in the maturation of the U5 snRNA. This will be done by creating a mutant Sen1p that causes a loss of the Smd3p interaction. This mutant will be placed in two different vectors: one expressing it endogenously, and a second causing over expression. By observing the effects of the different expression rates of this SEN1 mutation on the U5 snRNA processing pathway, I will determine the function of this interaction. Some RNA and DNA helicases have been shown to be multimeric. To determine if Sen1p is multimeric, I will perform an immunoprecipitation (IP) experiment and a yeast two-hybrid assay.

## **VALPROIC ACID: A NOVEL THERAPY FOR MEDULLARY THYROID CANCER?**

Max Cayo, Herbert Chen (Mentor), Surgery

Medullary thyroid cancer (MTC) is the third-most common type of thyroid cancer. Recent research has identified the Notch1 signal transduction pathway as an attractive target for the development of novel therapies for patients with MTC. Valproic Acid (VPA), a drug long in clinical use, has recently been reported as a possible Notch1 activator. Given this background, the aim of this research was to determine whether Notch1 activation with VPA in MTC cells results in suppression of tumor cell growth. VPA activates Notch1 in MTC cells and inhibits their growth. This finding is exciting and has clear clinical implications. Since VPA is already FDA approved, human clinical trials on VPA to treat patients with advanced MTC could be initiated relatively rapidly.

## **MONSOON CLIMATIC EFFECTS ON DUNE FIELDS IN NORTHERN CHINA**

Phueng Cha, Joseph Mason (Mentor), Geography

Precipitation is a major climatic factor that often correlates strongly with vegetation growth. Yet, in the dune fields of China, vegetation growth is not always strongly correlated with precipitation. This project entails the observation of satellite images such as Landsat, MODIS, and AVHRR, analyzed with the Arc Geographic Information Systems (ArcGIS) program. With the ArcGIS program, measurements of vegetation greenness can be taken and correlated with precipitation or other climatic factors. We hope to find out why different weather stations in the dune area contain different weather patterns. It is important to find such data due to its contribution to knowledge of how 30,000 years of changing dunes affect vegetation over time.

## **E-PORTFOLIOS AS A TOOL FOR TEACHER PREPARATION AND RESEARCH ABOUT CULTURALLY RESPONSIVE TEACHING**

Regina Chagolla, Ken Zeichner (Mentor), Curriculum and Instruction

The current study examines how student teachers' community-based learning experiences are translated into the classroom as culturally responsive teaching practices that build from students' prior knowledge and experiences. The study focuses on two groups of elementary education student teachers; 10 students in the professional development school program, and 10 students in the regular elementary education program. The student teacher's lesson plans and reflections put into electronic teaching portfolios during their professional education sequence of the elementary education program are reviewed and analyzed. Findings will serve to inform and validate current research of community-based learning experiences and culturally-responsive teaching in teacher preparation program.

## **CELEBRITY GOSSIP IN *THE CHICAGO TRIBUNE*, 1916–44**

Caitlin Cieslik-Miskimen, James Baughman (Mentor), Journalism and Mass Communication

The decision of newspapers to include more celebrity-based content to increase circulation has dismayed many journalists and editors. However, my examination of *The Chicago Tribune* and its celebrity gossip columns and feature stories between 1916 and 1944 has shown that today's trends are paradoxically reminiscent of content from the first half of the century, when such content was introduced in order to increase readership. Also important, my research revealed a shift in the content and tone of gossip columns. The arrival of snide and snoopng columnists such as Walter Winchell shifted content away from positive, industry-approved news, and toward the libelous, defamatory and highly read content currently seen in tabloids and newspapers nationwide.

**INDIANS IN THE PIONEER STATE:  
COLORADO INDIAN HISTORY TO 1880**

Courtney Cottrell, Ned Blackhawk (Mentor), History/Ethnic Studies

The purpose of this project is to fully understand Native American history in Colorado up until the 1880s. My contribution to this project will make up one part (specifically from 1840s to 1880) of five parts in a book. The entire book will consist of a compilation of essays, documents, maps, and photographs. My methodology is to read books and articles, as well as follow trails authors have left behind, to find historical documents they used in their research of this subject. This mapping of Colorado history will challenge what people know about the history of Colorado, as well as debunk some long-standing misconceptions about Native American history. It aims to give Native Americans the recognition they deserve for the history they helped to create.

**THE FATE AND FUNCTION OF THE  
ALLANTOIC MESOTHELIUM**

Jacob Daane, Karen Downs (Mentor), Anatomy

The murine allantois is the precursor tissue of the fetal umbilical cord that eventually fuses with the chorion to form the chorio-allantoic placenta. The allantois plays a crucial role in channeling nutrients and gases between the mother and developing fetus. Failure of the allantois to properly vascularize and/or fuse with the placenta has been linked to birth defects such as low birth weight, pre-natal death, and cerebral palsy. It has been discovered that the allantoic mesothelium, a thin layer of cells surrounding the allantois, generates definitive hemopoietic blood cells. Little is known, however, about the fate and function of the mesothelium. Here we investigate the hypothesis that the allantoic mesothelium plays a vascular role in the allantois.

## **PROJECT POLKADOT: POLK COUNTY ALCOHOL AND DRUG OUTREACH AND TRAINING**

Ashley Derenne, Florence Hilliard (Mentor), Substance Abuse, Continuing Studies

The intent of this project is to decrease alcohol and drug use in Polk County residents and adults from the St. Croix Tribe through improved screening, brief intervention, and referral services. The greater goal is to help reduce Wisconsin's elevated problems of substance abuse. A randomized survey given at the start and completion of the project evaluates the services from the previous year and the rate of substance misuse from subjects of a wide age range. PolkADOT is training health-care professionals to screen patients for intervention and refer for further assessments. The Department of Family Medicine will conduct a telephone intervention and follow-up. The anticipated outcomes are to increase services, increase knowledge of substance abuse, and decrease Polk's rate of substance abuse by 25%.

## **BIOCORE AMBASSADORS PROVIDE SCIENCE EDUCATION OUTREACH IN MADISON AND RURAL DANE COUNTY COMMUNITIES**

Kate Dielentheis, Caitlin Iverson, Margaret Melchior, Joel Miesfeld, Michelle Harris (Mentor), Biology Core Curriculum (Biocore)

As Biocore Outreach Ambassadors, we provide investigative, hands-on science experiences to public school students in Dane County by collaborating with teachers, administrators, and parents. The Biocore Ambassador program, begun in 2004 with a Wisconsin Ideas Fellowship, includes team-teaching in schools, one-on-one tutoring, and community-wide Science Nights. During 2006–07, we launched an ambitious initiative to regularly bring hands-on science to the classrooms of the rural Wisconsin Heights School District. The project has been overwhelmingly successful, impacting over one hundred students and their teachers. The Ambassadors program continues to grow, increasing its ability to engage a wide range of students in science exploration. We hope that our efforts will encourage these students' inquisitive scientific thinking and provide sustainable ideas and resources to public school teachers.

**EPIGALLOCATECHIN GALLATE INHIBITS  
GROWTH AND POLYAMINES IN HUMAN  
UROTHELIAL CARCINOMA OF THE BLADDER**

Kiley Djupstrom, Jason Gee (Mentor), Surgery/Urology

Epidemiological studies imply a lower risk of bladder cancer in regular green tea consumers. The purpose of this study is to determine the biological effects of the green tea compound epigallocatechin gallate (EGCG) utilizing an in vitro model of bladder cancer. We measured cellular growth and polyamine levels in three urothelial carcinoma cell lines grown in the presence of EGCG (0-50uM). Cell growth was determined by crystal violet elution over seven days. Polyamine levels (putrescine, spermidine, and spermine) were assessed after a 24-hour period using HPLC analysis. Our results reveal that all three EGCG-treated cell lines displayed growth inhibition and suppressed polyamine production in a dose-dependent fashion. These findings support further preclinical and clinical studies of EGCG in bladder cancer prevention.

**PROGRAMS TO ASSURE QUALITY  
ASSISTIVE TECHNOLOGY SERVICE FOR  
CHILDREN AND YOUTH WITH DISABILITIES**

Maya Dorsey, Ruth Benedict (Mentor), Kinesiology

Assistive technology devices (ATDs) assist children and youth with disabilities and special health care needs to carry out their daily living activities and help them to be as independent as possible. The purpose of this project is to determine if disparities in children's access to ATDs are associated with aspects of a state's service program, racial, or socioeconomic factors. In this portion of the research, I am gathering population data on the racial and socioeconomic composition of selected states as well as the characteristics of their ATD service programs. I will then determine if there are correlations between these variables and unmet ATD service needs using data from the National Survey of Children with Special Health Care Needs.

## **CO-TRANSPORT PATHWAYS CONTRIBUTING TO NORTH AMERICAN AIR POLLUTION**

Susanna Ehlers, Tracey Holloway (Mentor), Nelson Institute of  
Environmental Studies

Carbon monoxide, CO, is an important atmospheric species and greenhouse gas produced by many processes, including biomass burning and fossil fuel usage. In terms of atmospheric modeling, CO is an ideal tracer for indicating the presence of polluted air masses; it is well-modeled because of its simplistic chemistry and longevity. We seek to understand how CO is transported by quantifying episodic and background concentrations, as a way of understanding the intercontinental transport of polluted air masses. After comparing results of MOZART, a numerical global climate model, with observations, we define three main transport pathways of CO over North America. Knowing how CO behaves is key to understanding the regional impacts of intercontinental air pollutant transport.

## **STRATEGY USE IN PATTERN COMPLETION PROBLEMS IN CHILDREN WITH SPECIFIC LANGUAGE IMPAIRMENT**

Lauren Eisenband, Martha Alibali (Mentor), Psychology

Do children with specific language impairment (SLI) use different problem-solving strategies from their typically developing peers? We investigated this idea in a study of children's abilities to determine "what comes next" in pattern completion problems. Data from 36 children were included in a group-wise comparison between children with SLI and age-matched peers. Data from 38 children were included in a group-wise comparison between children with SLI and younger processing-capacity-matched children. Children with SLI were less likely to use an advanced problem-solving strategy than their age and IQ-matched peers, but their performance did not differ from children matched for processing capacity. Thus, differences in strategy use between children with SLI and age-matched peers may be due, at least in part, to differences in processing capacity.

## **PERSONAL EXPERIENCES WITH DIABETES IN UGANDA**

Shanee Ellison, Linda Baumann (Mentor), Nursing

There is a global epidemic of type 2 diabetes, with Uganda serving as an example of a developing and resource-poor country that is experiencing a sharp increase in this disease. The health-care system of Uganda is burdened by infectious diseases such as AIDS, malaria, and TB, and is ill-equipped to deal with chronic diseases such as diabetes and the complications that can result. In January 2007, I traveled to Uganda to examine the impact of diabetes on patients' families and social experiences by interviewing both adult patients with diabetes, and to gain insight into the role nurses play in managing diabetes. Data from the transcripts of open-ended interviews will be used to identify themes about the experience of diabetes from both patients and nurses, as well as potential strategies for improving diabetes care.

## **THE EFFECTS OF ENVIRONMENT AND SEED SIZE ON WILD TYPE ARABIDOPSIS THALIANA GROWTH AND DEVELOPMENT**

Angela Elwell, Edgar Spalding (Mentor), Botany

The extent to which environmental factors during seed production and seed size affect the development of subsequent seedlings are poorly understood in the model plant *Arabidopsis thaliana*. However, such influences could have significant bearing on genetic studies aimed at determining specific roles of genes in developmental pathways. This study aimed to quantify the effects of environment and seed size on the germination, root growth, gravitropism, and flowering time of the subsequent generation. *Arabidopsis* plants were grown to maturity in four different environments. Seeds were collected from each plant and the above parameters were measured to determine parental environment effects. Effects of seed size were determined by comparing the growth of plants from small seeds from all environments to that of large seeds from all environments.

## **ANTIOXIDANT STATUS IN CLINICALLY ILL DOGS AND CATS**

Elizabeth Farley, Lauren Trepanier (Mentor), Medical Science

Reduced antioxidant capacity has been documented in critically ill human patients. Antioxidant deficiencies have been correlated with illness severity and survival. The purpose of this study is to compare the antioxidant status of healthy and ill dogs and cats to determine whether antioxidant depletion is related to disease severity or clinical outcome. High Performance Liquid Chromatography methods were used to quantify plasma ascorbate, plasma cysteine, and erythrocyte glutathione. Data shows that all antioxidants were significantly lower in healthy cats versus healthy dogs. In ill dogs, glutathione was decreased with illness severity. In cats, illness was associated with increased ascorbate concentrations. The results of the study will allow us to predict what populations of ill dogs and cats will benefit from antioxidant therapy.

## **EFFECT OF WORD FAMILIARITY ON INITIAL CONSONANT ACCURACY**

Liza Felici, Jan Edwards (Mentor), Communicative Disorders

Children gradually acquire the sounds of their language during their first six years. Single-word picture-naming tests are used to assess whether children have articulation disorders, but these tests use only one word for each sound and some of these words are very familiar while others are not (dog vs. vacuum). This study was designed to examine whether lexical familiarity influenced the accuracy of initial consonant production. A word repetition task was used to elicit familiar real words and nonwords from a group of typically developing children, ages 2 years to 5 years. A subset of words and nonwords beginning with /t, d, k, g/ was selected for analysis. It was predicted that there would be a greater effect of familiarity on accuracy for younger children.

## **INTERPERSONAL PERCEPTIONS IN EXPERIENTIAL LEARNING GROUPS**

John Fink, William Hoyt (Mentor), Counseling Psychology

The Social Relations Model examines determinants of impressions in experiential learning groups using dimensions of control and affiliation. Perceiver bias measures one's average perception of others, whereas target effect shows the others' average perception of the one. High target variance of control shows consensus on dominance, but this consensus is only valid if the variance of perceiver bias is low. Less evidence of consensus on affiliation was shown with modest target variance, but the strong perceiver variance indicated that there was a range of perceiver bias. In our groups, there was consensus on who took charge and who didn't, but it was harder for the members to come to agreement on who was the friendliest due to the range in how participants generally perceived affiliation.

## **WHY IS OBESITY IN THE BLACK COMMUNITY SO HIGH?**

Laseanza Flowers, Lydia Zepeda (Mentor), Consumer Science

It is a fact that in the black community, many African Americans are dying quickly from obesity. Statistics show that 35% of obese African Americans have an income of under \$10,000. Obesity causes Type 2 diabetes, one of the leading causes of death among African Americans. Some causes of obesity are poor diet, not exercising, and low income. This project asked "What are the relationships among black children, TV, food, and their neighborhood?" "How does this effect obesity in the black community?" "Does being in a low-income bracket play a role in being obese in the black community?" I conducted surveys of 3rd, 7th, and 9th graders about their TV viewing habits and eating habits while watching TV. I also surveyed eight low-income mothers from my neighborhood about food buying and food preparing. I also used scientific literature to support my findings.

## **DESCRIBING PATIENTS' OBSTACLES TO REACHING THEIR HEALTH GOALS**

Colleen Foley, Jodi Kurtz, Diane Lauver (Mentor), Nursing

Many Americans experience obstacles in pursuit of health goals. Attempts to understand such obstacles have not been the focus of much prior research. Our purpose was to describe the participants' obstacles to reaching health goals. As a part of a larger study using a pre–post-intervention design, we used a descriptive design. Fifty-two participants volunteered from Midwest clinics and communities. The participants were 24–64 years old, and 41 were female. Data were collected in six weekly interviews with Advanced Practice Nurses. Content analysis was used to describe responses. From results of 46 participants, the most common obstacles were mood interferences, non-routine events, food availability and preferences, and lack of knowledge and awareness. By understanding such obstacles, practitioners can tailor interventions and people will be able to reach their health goals.

## **ONCOLOGY NURSES' USE AND PERCEIVED EFFECTIVENESS OF INFORMATION SOURCES FOR NONDRUG PAIN TREATMENTS**

Abby Frese, Kristine Kwekkeboom (Mentor), Nursing

Guidelines for cancer pain management recommend using nondrug strategies as adjuvants to analgesic medications. However, studies indicate that nurses use these strategies infrequently. Nurses' exposure to information about nondrug strategies may help explain practice behaviors. The purpose of this study was to survey oncology nurses regarding access to and perceived usefulness of various sources of information about nondrug pain interventions. We collected surveys from 35 oncology nurses at the University of Wisconsin Hospital and Clinics. We will identify which information sources were most accessible to nurses and describe how different sources of information influenced nurses' cognitive, psychomotor, and affective knowledge about nondrug pain interventions. Results may be useful in designing effective methods of disseminating information that improve nurses' use of nondrug pain treatments in practice.

## **KNIT 2 TOGETHER**

Sarah Gagnon, Diane Sheehan (Mentor), Environment, Textiles and Design

This service-learning project was developed as a two-semester after-school program for adolescent girls in partnership with the local Atwood Girl Neighborhood Power and supported by the School of Human Ecology. We taught 14 girls to knit or crochet in a relaxed, cooperative atmosphere, helping them learn basic skills and then produce creative projects. During the first semester, the participants made two special projects. One was a gift for an AIDS orphanage in Namibia, and the second was a collaborative project—a blanket—which was a gift to the Girl Neighborhood Power coordinator. During the second semester the girls developed color studies and are developing individual projects of their choosing. Through this process we learned from the girls and sharpened our skills as teachers.

## **MOTHERHOOD UNBOUND: THE LEGACY OF THE MOTHERS OF THE PLAZA DE MAYO**

Elizabeth Gausden, Ksenija Bilbija (Mentor), Spanish and Portuguese

Thirty years ago a military dictatorship began in Argentina, during which tens of thousands of people, known as *los desapercidos*, were abducted and held without trial. In 1977, a group of mothers of the missing, later called the Mothers of the Plaza de Mayo, began weekly demonstrations at the May Square. They left the private space of their homes and became players in the public arena, using their gender in a civil conflict. How have the group's objectives changed over the past thirty years and what is the legacy that they have created? Through observation, interviewing members of the Mothers of the Plaza, and researching archives in Buenos Aires, I sought to answer these questions and provide insight into the transitioning movement.

**COFFEE, LAND, AND SOCIAL STRUGGLE:  
HISTORICAL MEMORY AND COMMUNITY IN  
SANTA ANITA, GUATEMALA**

Beth Geglia, Florencia Mallon (Mentor), History

The community of Santa Anita, Guatemala, has a unique and important history to tell. Their story is the story of the global coffee industry; land and indigenous issues in Guatemala; civil war and state repression; Fair Trade and economic alternatives. This project seeks to aid the community of Santa Anita in remembering and documenting that history through collective mural painting, basic film training, and a collaborative documentary film that will both educate outsiders and serve community needs. The procedures of the project are based on the ideas that communities should have control over how their histories are told and that collective memory can be a powerful tool for self-empowerment.

**LOCALIZATION OF KISSPEPTIN NEURONS IN THE  
PREOPTIC AREA AND HYPOTHALAMUS OF  
RHESUS MONKEYS**

Allison Goff, Ei Teresawa (Mentor), Pediatrics

Kisspeptin is a neuropeptide that has been proposed to modulate release of gonadotropin-releasing hormone (GnRH) in the hypothalamus and may be important for the onset of puberty. This project is designed to study the distribution pattern of kisspeptin in the preoptic area and hypothalamus of rhesus monkeys. Brain tissue sections were immunostained with the antibodies (GQ2 and ab566) against the kisspeptin protein. The preliminary results indicated that kisspeptin cell bodies were found in the arcuate nucleus and fibers were distributed in the preoptic area and basal hypothalamus, particularly in the periventricular region, median eminence, and pituitary stalk. However, no GnRH neurons co-localized with kisspeptin peptide. The results suggest a possible role of kisspeptin in GnRH release.

**A STUDY OF PARKINSON'S CIRCUITRY:  
CONNECTIONS BETWEEN SUBSTANTIA NIGRA  
AND SUPERIOR COLLICULUS**

Jessie Grewal, Michele Basso (Mentor), Physiology

In Parkinson's disease, dopaminergic neurons in the basal ganglia, specifically the substantia nigra pars compacta (SNc), degenerate causing an overactivation of the substantia nigra pars reticulata (SNr). This overactivation inhibits the superior colliculus (SC), an area that plays a key role in saccadic (rapid) eye movements. The anatomical study of the connections between the SN and the SC is essential, because it will help us in understanding how deep brain stimulation (DBS) therapy alleviates Parkinsonian symptoms. We have been examining primate brain sections with retrogradely tracing gold particles of two different sizes injected in the SC. Eventually, these particles traveled back to the SNr and now we are able to determine which parts of the SNr control which parts of the SC.

**EVALUATION OF SURFACE TREATMENTS FOR  
FUEL CONTAINMENT TUBES TO IMPROVE  
NUCLEAR REACTOR PERFORMANCE**

Jesse Gudmundson, Kumar Sridharan (Mentor), Engineering Physics

Neutron absorbing elements such as boron are routinely added to nuclear fuel pellets to counter excessive neutron activity during the start-up phase of a nuclear reactor. This research investigates an alternative approach, namely, incorporation of boron into the outer surface of nuclear fuel containment tubes. This avoids several economic- and performance-related drawbacks involved in its incorporation into the fuel pellets. Two surface treatment methods are being investigated. One approach involves cold spraying zirconium diboride particles to coat the surface and the other involves a high energy ion beam process to melt and alloy a thin layer of boron into the surface. Preliminary analyses and high-temperature tests suggest that either surface treatment approach could be used without any adverse effect on corrosion resistance.

## **EFFECT OF PESTICIDES ON THE IMMUNE SYSTEM**

Morgan Gustison, Warren Porter (Mentor), Engineering

Organophosphate pesticides, like Chlorpyrifos, are shown to have toxic effects at low doses previously thought safe. Our objective was to test the hypothesis that Chlorpyrifos would suppress the immune response in mice after exposure to sheep red blood cells. We exposed the mice to different levels of Chlorpyrifos in utero. After injecting the adult mice with sheep red blood cells to stimulate an immune response, we conducted an ELISA on the serum to find the antibody titer. Contrasting our hypothesis, the response of the low and high doses appeared to increase the titer by 1.5 percent above the untreated group. The differences were not statistically significant. Further studies should be designed to test the significance of our results.

## **EARTHWORM POPULATIONS IN PRAIRIE GARDENS AND LAWNS IN MADISON, WISCONSIN**

Rachael Hager, Marie Johnston, Nick Balster (Mentor), Soil Science

We hypothesize that earthworm populations vary with vegetation type. We investigated two residential vegetation types: prairie gardens and lawns. We extracted earthworms using spicy mustard in soil beneath prairie garden and lawns at residential homes in Madison, WI. Although the total number of earthworms did not differ by vegetation type in the fall ( $p = 0.25$ ), it appears the types of worms differed. The lawns tended to have larger, pigmented worms compared to the prairie gardens, which may result from different food source preferences. We continue this investigation in the spring. We expect to see an overall increase in the number of adult earthworms in spring relative to the fall, as well as a continuation of trends in worm type.

## **SPATIAL PATTERN OF LYME DISEASE OCCURRENCE IN THE HUMAN POPULATION OF DUTCHESS COUNTY, NEW YORK**

Stephanie Hall, Monica Turner (Mentor), Zoology

Lyme disease is a tick-borne illness found throughout America that causes skin rashes, cardiac abnormalities, and neurological problems. Current research suggests that landscape patterns influence the rate of Lyme disease in tick populations; however, it is unknown if this translates to increased rates in human populations. In this study, I examined the relationship between landscape features and the spatial distribution of Lyme disease in the human population of Dutchess County, New York. Multivariate analysis was used to determine how (1) residential proximity to waterways, (2) road density, and (3) forest fragmentation affect the distribution of Lyme disease in the human population. Understanding how landscape development affects the distribution of Lyme disease could enhance preventative policy and inform urban development.

## **BIOMECHANICAL PERFORMANCE IN F2 INTERCROSS OF HCB/DEM MICE**

S.J. Han, Robert Blank (Mentor), Medicine

A key factor in bone fracture is overall bone strength. As humans age, the probability of fracture increases, through a disorder like osteoporosis or due to one's genetic constitution. To study the genetic contribution to bone strength, a mouse model was utilized. Bones from F2 generation offspring from reciprocal intercross of HcB/8Dem and HcB/23Dem were analyzed by 3-point bend testing. From the load-displacement curves obtained from each bone, various whole bone mechanical phenotypes are extracted. By obtaining the geometric measurements of the bones, tissue-level phenotypes are calculated. Several bone strength loci have been mapped in this experiment.

## **MAYA HIEROGLYPHICS: UNDERSTANDING CIVILIZATION THROUGH DECIPHERMENT**

Eric Hanson, Theresa Heindel, Jaclyn Kemp, Carol Morse, Michael Rendelman, Jason Yaeger (Mentor), Anthropology

For centuries Maya ruins and their carved monuments have fascinated people, but only in the past 35 years has progress truly been made in the decipherment of the Maya hieroglyphs. This new understanding of Maya texts provides a new window into Maya religion, politics, and history. We intend to demonstrate the value of these texts by translating a Classic Maya inscription and explaining its historical significance. We will decipher Stela 31 from the site of Tikal, Guatemala, and discuss the insights it provides about Maya historical processes and royal authority. We will also show how the monument's placement within the site (its archaeological context) provides even richer insights in how Maya kings used monuments and history to legitimate their authority.

## **ANALYSIS OF THE EVOLUTION OF STEM CELL TECHNOLOGY IN THE UNITED KINGDOM**

Ian Hanson, Sanjay Jain (Mentor), School of Business

The research being done on embryonic stem cells (ESC) is controversial, yet medically valuable, as it has enormous potential to treat cancer, Parkinson's disease, and many other medical problems. The United Kingdom is home to many ESC research achievements and pioneered the regulation of this research; their research guidelines have influenced institutions across the globe. This project analyzes the evolution of stem cell science in the UK by considering how economic, governmental, religious, ethical, social, and academic influences helped create a pioneering regulatory framework for research. This project drew upon various sources to gather information that is being applied toward writing a research paper on this topic. This is part of a larger project analyzing the global status of stem cell research.

## **EPIGENETIC SILENCING AS THE SECOND HIT IN TUMOR FORMATION OF APC(MIN/+) RB9 MICE**

Cory Hartman, William Dove (Mentor), Oncology

The Knudson two-hit hypothesis states both alleles of a tumor suppressor gene must be mutated in order for a tumor to form. Historically, in familial cases the second hit is a loss of chromosome material or genetic mutation in the wild-type allele. Mice with a germline mutation in the adenomatous polyposis coli (Apc) gene are predisposed to intestinal neoplasia. I have shown by quantitative allele specific Pyrosequencing assay that 30% of tumors in mice carrying a Robertsonian translocation (Rb(7.19)9Lub) develop tumors that maintain the wild-type allele at the Apc locus. I intend to test whether the second hit in these tumors is due to epigenetic silencing of the wild-type allele, using quantitative assays for Apc promoter methylation and wild-type Apc mRNA.

## **SEMI-SYNTHESIS OF DIHYDRO-ISO-MIGRASTATIN AND DIHYDRO-LACTIMIDOMYCIN AS TUMOR METASTASIS INHIBITORS**

Yeng Her, Ben Shen (Mentor), Pharmacy

The purpose of this project is to diversify and develop new anti-cancer agents through semi-synthesis of dihydro-iso-migrastatin and dihydro-lactimidomycin. First, we produced iso-migrastatin and lactimidomycin through fermenting *Streptomyces platensis* NRRLKS993 and *Streptomyces amiphibiosporus* R310-104. Second, the natural products were isolated using silica-gel flash chromatography. Finally, semi-synthesis of dihydro-iso-migrastatin and dihydro-lactimidomycin were prepared by reducing the lactone group of iso-migrastatin and lactimidomycin via Stryker's reagent. A biological evaluation conducted by Johns Hopkins School of Medicine showed that dihydro-iso-migrastatin had a weaker activity against cancer cell lines than iso-migrastatin. Meanwhile, dihydro-lactimidomycin displayed strong activity against cancer cell lines.

## **TRANSITIONAL JUSTICE DATABASE**

Eileen Herden, Leigh Payne (Mentor), Political Science

Transitional Justice (TJ) refers to a range of institutional arrangements set up to address past authoritarian state violence and human rights abuses as states move from periods of authoritarian rule to peace and democracy. A facet of the database focuses on the question of suitable conditions for TJ, and asks, “Does an individual leader’s relationship to the authoritarian regime affect the likelihood of TJ mechanisms being instituted, and are leaders with a positive human rights background more likely to institute TJ mechanisms?” The group hypothesized that strong positive correlations would be found in both cases. Once the entire database is complete and other hypotheses have been tested, the project will be relevant to state policy-making and advance academic scholarship on the subject.

## **REGULATION OF ENERGY METABOLISM THROUGH INSULIN AND LEPTIN SIGNALING PATHWAYS**

Jessica Holliday, Vicky Krezowski, Dongsheng Cai (Mentor), Physiology

Insulin and leptin are two hormones in the hypothalamus involved in energy metabolism regulation. Within the hypothalamus, when POMC/CART positive neurons are activated by insulin or leptin, they secrete neuropeptides to the secondary class neurons and result in a decrease in food consumption and energy expenditure increase. The opposite is true of AGRP/NPY positive neurons. By activating these neurons, leptin and insulin balance energy intake and energy output, thus maintaining normal body weight. We are investigating how insulin and leptin signaling cascades are affected by an inflammatory pathway, IKK-beta/NF-kappaB underlying the development of obesity and diabetes. We have generated transgenic mice, in which IKK-beta is selectively activated or ablated in distinct neuronal subpopulations of the hypothalamus. We expect to find targets to regulate energy metabolism and the treatment of both diseases.

## **SELF-OBJECTIFICATION AND DEPRESSION: LINKS TO GENDER AND ETHNICITY**

Sarah Hubbard, Shelly Grabe (Mentor), Women's Studies

A large body of research indicates that higher rates of depression are found among women than men in Western industrialized cultures and that within all cultures that have the thin body ideal, women experience more depression than do men (Nolen-Hoeksema, 1987). Objectification Theory argues that learned cultural practices of sexual objectification lead girls and women to self-objectify (Bartky, 1990), which leads to specific negative affective experiences. Preliminary analyses suggest that college women report higher levels of self-objectification than their male counterparts and that self-objectification is related to depression for women, but not for men. In addition, findings suggest that white women report higher levels of self-objectification than their Asian-American counterparts and that self-objectification relates to depression among white women, but not Asian-American women. This study will present data from a large pool of undergraduate college students who have completed the Self-Objectification Questionnaire and the Beck Depression Inventory.

## **DEMONSTRATING THE CONNECTION BETWEEN ACTION AND LANGUAGE COMPREHENSION**

Maia Jacobs, Arthur Glenberg (Mentor), Psychology

Previous behavioral and neurophysiological work has demonstrated connections between language and action. But, does the same neural system underlie the two? If so, then recalibrating the action system through practice should change one's ability to comprehend language that calls on that action system. We recalibrated the action system by having people move 600 beans either toward or away from themselves. Then they read sentences describing transfer of objects to another person (away) or from another person (toward). We found that the direction of practice differentially affected the time to comprehend the transfer sentences. These data contradict previous theories that language is an independent module unaffected by other systems. Modifying our knowledge about language can help in improving education in regards to reading and speech.

## **SUBSTITUTION EFFECTS ON N-SULFONYL OXAZIRIDINES IN COPPER (II)-CATALYZED AMINOHYDROXYLATION OF ALKENES**

Ashley Jacobsen, Tehshik Yoon (Mentor), Chemistry

The amino alcohols is an important functional group in natural products and pharmacological drugs. While amino alcohols are traditionally synthesized using an expensive and toxic osmium catalyst, researchers recently showed that copper (II) salts can be used to catalyze the aminohydroxylation of alkenes with N-sulfonyl oxaziridines. In an interest to broaden the efficiency and utility of this reaction, the nature of the N-sulfonyl protecting group of the oxaziridine needs to be modified. The ideal sulfonyl protecting group would accelerate the copper (II)-catalyzed aminohydroxylation of both electron-rich and electron-poor alkenes and be easily removed. Specifically, 2-tert-butylsulfonyl-3-phenyloxaziridines are of interest due to the synthetic utility of the 2-tert-butylsulfonyl (Bus) protecting group (facile deprotection). N-benzenesulfonyl oxaziridines that are substituted at the para position are also of interest because they are easy to deprotect and have the potential to speed up the rate of the reaction. Herein we report the synthesis of a variety of N-sulfonyl oxaziridines and the screening of the oxaziridine as an aminohydroxylating agents. Initial efforts to remove N-sulfonyl protecting groups of each aminohydroxylation product will also be discussed.

## **IDENTIFICATION OF THE FUNCTIONAL DOMAINS OF ARABIDOPSIS FLS2**

Kristin Jansen, Andrew Bent (Mentor), Plant Pathology

Arabidopsis FLS2 is a leucine-rich repeat (LRR) transmembrane receptor-kinase that recognizes bacterial flagellin, indicating pathogen presence to the plant. Flg22, a 22 amino acid peptide highly conserved among bacterial flagellin, binds FLS2, eliciting plant defense response. A set of residues in the LRR domain were selected based on the degree of evolutionary conservation among other Brassicaceae and were examined using site directed mutagenesis to identify functional regions. None of these mutations affected FLS2 function. Additionally, putative N-glycosylation sites were disrupted to determine the role of glycosylation in the structure and/or function of FLS2. One of the 17 sites was found to have decreased flg22 response and abnormal FLS2 expression. This recognition apparatus is a model system for studying disease resistance in plants and animals.

## **STEM CELL DEVELOPMENT IN THE UMBILICAL CORD**

Dexter Jin, Karen Downs (Mentor), Anatomy

Stem cells have the tremendous ability to differentiate into various types of cells. The murine allantois will become the umbilical cord. Recently, it was discovered that a novel region, called the Allantoic Core Domain (ACD), has the ability to generate the primary umbilical blood vessels. The ACD is also known to contain a significant quantity of stem cells. Our hypothesis is that the cells contribute to the development of the primary vasculature, which is essential in establishing the umbilical vessels. My goal is to create a pure population of Oct-3/4 cells by explanting the ACD containing region onto feeder cells, transplant these cells back into the allantois, culture the conceptus, and search for LacZ cells in the umbilical cord.

## **CHANGING GENDER, POWER, AND LEADERSHIP OF PUBLIC ORGANIZATIONS: A TWENTY-YEAR EVOLUTION**

Amanda Johnson, Georgia Duerst-Lahti (Mentor), Political Science

This project compares current institutional conditions of public leaders in state agencies with organizational elements 20 years ago in order to gain a better understanding of conditions that foster and impede women executives as leaders. This research involves determining what has changed since the data gathered in 1985 through 43 interviews and public records. We conducted 62 structured interviews of top administrators, which will be used to find factors that have made women's advancement possible and consider how expectations for men have altered. My presentation focuses on the analytic process of creating the data set from the interviews and complications of preliminary analysis. I also discuss the method for inductively determining categories of analysis from qualitative comments and transforming these data for quantitative analysis.

## **CHILD, PARENT, AND FAMILY OUTCOMES OF THE STRENGTHENING FAMILIES PROGRAM**

Lindsay Johnson, Brooke Miller, Susan Riesch (Mentor), Department

Our objective was to test the effectiveness of the Strengthening Families Program (SFP) for families with children ages 10–14 on improving school connectedness, parenting skills, and family functioning to prevent or delay the initiation of childhood health risk behaviors. We used an experimental design in which public schools in Madison and Indianapolis were assigned to intervention or comparison groups. Families from intervention schools participated in the 7-week SFP 10-14; families in the comparison group did not. Survey and observational data were collected to measure the variables before, one month after, and 6 months after the program. Families gave the program high marks, but our recommendations will depend on the statistical analyses that are currently underway.

## **ENGRAFTMENT OF HUMAN HEMATOPOIETIC PROGENITORS IN THE MURINE HOST**

Kelly Jones, Aimen Shaaban (Mentor), Surgery

Animal models of human hematopoiesis serve as valuable translational tools for studies of hematopoietic cell differentiation and immunology. Historically, the development of such models has been complicated by low levels of human hematopoietic cell engraftment. Nonobese diabetic/severe combined immunodeficient gamma chain receptor knockout mice (NOD/SCID/gc<sup>-/-</sup>) lack T, B, and functional NK cells providing a niche for the engraftment of human hematopoietic progenitor cells (HPCs). This project sought to develop a system for producing high-level human HPC engraftment in NOD/SCID/gc<sup>-/-</sup> mice. Early results with a novel protocol reveal 1–11% human chimerism in the peripheral blood of three-week-old mice that received HPC transplantation as newborns. Subsequent experiments will confirm the stability of this engraftment and pursue methods to expand human hematopoietic chimerism.

## **DESIGNING BIOMATERIALS FOR TISSUE-ENGINEERED HEART VALVES**

Quinton Katler, Kristyn Masters (Mentor), Biomedical Engineering

Numerous problems exist with current heart valve replacements, including poor blood compatibility and high rates of failure. The development of a tissue-engineered heart valve would solve many of these problems, in addition to providing a tissue replacement that is capable of natural growth and repair. The first step in designing biomaterials to act as scaffolds for tissue engineering is to examine how the function of heart valve cells (VICs) is controlled by the biomaterial environment. Thus, we have grown VICs on numerous surfaces with different mechanical and biological properties, and we have shown that both the mechanics of the material and the type of biological molecules presented by the material significantly influence the health of the cells. These findings will be useful in expanding our knowledge of native heart valve disease and in benefiting all future heart valve replacement recipients.

## **NEGATIVE AFFECT DURING NICOTINE WITHDRAWAL: EFFECTS ON ANXIETY VS. FEAR**

Jesse Kaye, John Curtin (Mentor), Psychology

Prominent addiction theories postulate that alleviation of withdrawal-induced negative affect is a primary motive for drug use. Self-report studies confirm that negative affect is a potent symptom of drug withdrawal. However, psychophysiological data have yet to corroborate this claim and explicate the underlying neurobiological mechanism(s). In this study, 24-hour nicotine withdrawn and non-withdrawn smokers completed contingent (electric shock administered during CUE+ only) or non-contingent (shock administered randomly) conditioning procedures. Fear potentiated startle indexed the expression of fear vs. anxiety during these conditioning procedures. Nicotine withdrawal selectively exacerbated smokers' anxiety during non-contingent shock administration. In contrast, withdrawal had no effect on smokers' fear during contingent shock administration. This selective effect clarifies the nature of the affective disruption during nicotine withdrawal and suggests a specific neurobiological mechanism.

## **IMPACT OF THE MEDIA ON COLLEGE STUDENTS' SPENDING HABITS**

Megan Kelley, Lydia Zepeda (Mentor), Consumer Science

Consider this: There are 15.6 million college students living in the United States who, combined, spend around \$78 billion per year. These factors provide marketers ample incentive to target college students. Corporations use tactics such as direct mail, posters, flyers, online surveys, and coupons to entice college students to buy their products. These observations led to the research question: Does the media influence college spending habits? The methods used to answer this question included a survey and taste test with college students comparing the consumption of two similar sport drinks: Gatorade and Powerade. Overall, the focus of this research was to determine if students consumed the products they most preferred, or if there was a confounding factor in their selection, such as the media.

## **SMART LIQUID MICROLENSES**

Tong Khang, Hongrui Jiang (Mentor), Electrical and Computer  
Engineering

Liquid microlenses have shown great potential to miniaturize optical systems. We are working on smart liquid microlenses using intelligent materials, called hydrogels, that are able to change their volumes upon changes in stimuli around them. Microfabrication is used to form these devices, such as patterning of hydrogels and microchannels. We have demonstrated that through syringe pumps, fluids can be transferred into microchannels, and as temperature and pH value of fluids are changed, hydrogels expand and contract to actuate liquid droplets located inside hydrogel rings to protrude up and down. Further work will be addressed to improve the reliability and robustness of these devices by optimizing fabrication processes and material properties. This microlens technology could advance lab-on-a-chip technology, biological uses, and clinical applications.

## **CHARACTERIZATION OF MULTIPHASIC, MULTI-DRUG RELEASE KINETICS FROM SINGLE DELIVERY MATRIX**

Kyle Kleinbeck, Weiyuan John Kao (Mentor), Pharmaceutical Science

Photopolymerized interpenetrating networks (IPNs) of polyethylene glycol and gelatin have shown efficacy in the healing of full-thickness wounds. IPNs are capable of releasing soluble components or covalently linked components. In support of the IPN as a clinical wound treatment, pain and infection could be managed through in vivo release of local anesthetic, bupivacaine HCl (BupHCl), and antimicrobial, silver sulfadiazine (AgSD). BupHCl and AgSD give different in vitro release profiles when loaded in separate IPNs or concurrently in one IPN. A Fickian model of diffusion was derived to predict the specific release of BupHCl and AgSD for future applications. Characterization of clinical potential for BupHCl and AgSD loaded IPNs will include bacterial inhibition testing and in vivo applications upon wounds of varying thicknesses.

## **A STUDY OF THE GROWTH PATTERNS AND BIOMARKERS OF PHEOCHROMOCYTOMA**

Benjamin Klingenberg, Wei Huang (Mentor), Pathology

Pheochromocytoma is a type of tumor that is typically found in the medulla of the adrenal gland. The most common symptoms are hypertension, headache, tachycardia, and sweating. Some pheochromocytoma can be cured by resection. Others can metastasize and recur. Currently, there is little knowledge of how pheochromocytomas behave, or why some tumors become malignant while others do not. The goal of this project is to study the morphologic features and biomarkers of the tumor in order to predict its progression. Tissue slides and clinical data of pheochromocytoma cases from UW Pathology archive will be reviewed. Tissue microarray will be constructed. Hopefully morphological parameters or biomarkers can be discovered to predict the tumor behavior. Doctors will be able to develop a more effective treatment plan for patients suffering this illness.

## **ETHNOHISTORY OF McCORD VILLAGE**

Minetta Koblings, Rachel Zorn, Larry Nesper (Mentor), Anthropology

Between 1890 and 1950, an inter-tribal band of Native Americans inhabited a small, secluded area known as McCord Village in Northern Wisconsin. McCord was unique because it included representatives of Potawatomi, Ho-Chunk, Menominee, and Ojibwe tribes, who, taking advantage of their location, managed to maintain their traditional practices in a time when such practices were discouraged by the federal government. This research project takes an anthropological and ethnohistorical approach while studying who lived in McCord, how McCord helped to preserve Native American traditions, and how McCord interacted with and was viewed by the non-Indian settlers nearby. As of now, we have collected articles about McCord and related Indian activities from microfilmed newspapers at the Wisconsin Historical Society and have made a timeline of those events.

## **IMPROVING HEALTH-CARE FOR MIGRANT WORKERS**

Kevin Konieczko, Alfonso Morales (Mentor), Sociology

I have been continuing research on a study that sought to promote health-related quality of life among migrant workers by creating and implementing a social currency program. Relationships were established between a clinic, that clinic's Promotora organization, and a nearby university. These partners designed a program and recruited migrant workers to implement the program in a club they would create. The club Nuevos Amigos was created and held biweekly meetings. The pilot program was successful; health and health-related expenses were paid and the quality of life improved. Additionally, the community benefited from this new civic organization. My work has been to research articles similar to this research to draw comparisons between them. The relatively few problems and the many benefits of this study demand further experimentation.

## **SURVEY OF STUDENT ATTITUDES TOWARD FIRST-YEAR WRITING**

Annika Konrad, Michael Bernard-Donals (Mentor), English

An integral part of UW–Madison’s first-year writing program (English 100) is peer review. My survey was designed to assess students’ attitudes toward peer review in English 100 and its role in their progress as writers in classes beyond their first year. The survey will be distributed via e-mail to a random selection of currently enrolled students who have taken English 100. The survey asks questions about students’ background as academic writers and about students’ attitudes toward peer review in English 100 and subsequent writing courses. The data will allow me to draw conclusions about the effectiveness of peer review in an ever-changing English 100 program.

## **BICULTURAL COMPETENCE AS A RESILIENCE FACTOR AMONG ETHNIC MINORITY ADOLESCENTS**

Desiree Kroes, Jennifer Lindwall (Mentor), Counseling Psychology

External factors largely determine student achievement, which puts ethnic minorities at high risk for academic failure; this suggests successful students demonstrate resilience. In order to increase resiliency, we must identify personal factors of successful minority students by examining intelligence, social skills, cultural identity, and strategies for coping with cultural diversity including bicultural competence [one’s ability to navigate within two cultural contexts (Coleman, 2005)]. This study explores how academically successful minority youth are influenced by family, school, peers, and community contributing to their bicultural competence and resiliency. It is hypothesized that bicultural competence enhances personal, academic, and social adjustment. Adolescents in a pre-college program completed surveys and engaged in a focus group giving the opportunity to share factors enabling their success. These interviews were analyzed for common themes.

## **USE OF INTERFEROMETRIC AUTOCORRELATOR FOR MEASUREMENT OF PULSE FREQUENCY BANDWIDTH**

Brett Kroncke, John Wright (Mentor), Chemistry

The shape and frequency content of a train of infrared laser pulses in the femtosecond ( $10^{-15}$ sec) regime become difficult to measure precisely because of the limited number of detectors that will work at that frequency and pulse duration. However, this shape and frequency information is critical to understanding how a sample interacts with the impinging light. Currently, a monochromator analyzes the frequencies of light present in the femtosecond light pulses. My project is to design and interface a device called an autocorrelator, which will measure the spectral and temporal characteristics of an ultrafast pulse train in real time. An autocorrelator will quickly give information about the pulse shape and temporal phase and eliminate the need for a monochromator. My work has focused on designing, building, testing, and optimizing the autocorrelator, as well as developing the interface and the software required to automate it.

## **EXPRESSION OF DBD 18**

Carly Kuehn, Eugene Kaji (Mentor), Medicine

Our laboratory studies cardiac myocyte hypertrophy and how the thyroid hormone receptor ( $TR_{\pm}$ ) is involved in regulating hypertrophy. The laboratory determined that an unknown protein, DNA Binding Domain 18 (DBD18), interacts with thyroid hormone receptor in yeast. To determine DBD18's role in cardiac myocyte hypertrophy, we tested to see if there is expression of DBD18 in the heart with northern blots of various organs and real time PCR of RNA from hearts treated with varying amounts of thyroid hormone to induce hypertrophy. Results indicate that there is expression of DBD 18 in the heart, and we continue to work on quantifying the amount of DBD18 expression in hearts treated with varying amounts of thyroid hormone.

## **NEURAL AXON OUTGROWTH AND GUIDANCE, AND THE ROLE OF TAG-1**

Nicholas Kuehnel, Mary Halloran (Mentor), Zoology

During neural development, axons must be properly guided toward specific targets to establish a functional nervous system. We are studying the development of medial longitudinal fascicle (MLF) axons in the zebrafish. MLF axons originate in the midbrain and extend into the spinal cord as a tight bundle. We used a transgenic zebrafish line that expresses GFP in the MLF neurons to characterize their cell body number and axon outgrowth from 16 hpf to 36 hpf. These data give a baseline of normal development with which to compare axon development after manipulation of guidance molecules. We used morpholino antisense to knockdown the cell adhesion molecule TAG-1, which is normally expressed in nucMLF axons. Our results show that TAG-1 is critical for proper MLF axon outgrowth.

## **BIOCOMPATIBILITY AND POLYMER WEAR OF TI-HF ALLOYS AND DLC COATINGS FOR ORTHOPEDIC APPLICATIONS**

Stephanie Kuhn, Kumar Sridharan (Mentor), Engineering Physics

Every year, about 300,000 total hip replacement (THR) surgeries are performed in the United States. The typical lifespan of an implant ranges between 10 and 20 years, and the majority of implant failures are related to materials issues such as biocompatibility, wear, corrosion, and premature stress failures. The objective of this research is to address two important materials issues in orthopedic devices: biocompatibility and generation of polymer wear debris, which causes adverse tissue reactions. The research examines the feasibility of using a new class of materials, namely Ti-Hf alloys and low friction diamond-like carbon coatings, for improving the performance of orthopedic devices. The research is done in collaboration with the College of Engineering and the School of Veterinary Medicine at UW and NASA, Cleveland.

## **VOICES OF WOMEN IN A GLOBALIZING INDIA: FILM PROJECT**

Ashok Kumar, Joseph Elder (Mentor), Sociology

I plan to film an ethnographic documentary narrating the stories of women in an increasingly globalizing India. The project is a collaborative effort among the International Human Development and Upliftment Academy (IHDUA), Professor Joseph Elder, and me, and it would serve the IHDUA by helping educate the UW–Madison community and ultimately create an international service program to IHDUA projects in India. I intend to spend three months within India documenting tribal, rural, and urban peoples and filming a wide array of issues effecting women. The project hopes to bring to light the possible negative effects of modernization on the women in India, counteracting the popular notion that globalization benefits everyone in India. On arriving back in the United States, I intend, with the assistance of Professor Elder, to spend the fall semester editing the raw footage then utilizing it for educational purposes with the public, creating an interest in IHDUA within the UW community. The final goal of the project is the creation of a foreign service program for students, through UW, to work on IHDUA projects in India.

## **THE EFFECTS OF AGING ON POSTVOID RESIDUAL URINARY VOLUME**

Kira Labby, Dale Schoeller (Mentor), Nutritional Sciences

Postvoid Residual Urinary Volume (PRUV) is the inability to fully empty the bladder when voiding and is seen largely in the elderly population. It has been shown that the incidence of PRUV increases with age, but no research has been conducted about whether the severity of PRUV will progress with the age of a PRUV victim. I will be investigating this question using data obtained from subjects in a similar study 10 years ago and new data obtained from the same subjects; thus, the subjects are their own controls, and any relationship of PRUV severity with aging will be identified.

## **PROMOTING PREPAREDNESS**

Kathryn Lease, Erik Carter (Mentor), Rehabilitation Psychology and  
Special Education

Promoting Preparedness is a research initiative to support the educational, social, and emotional growth of at-risk children in the Madison area through the enhancement of the Head Start educational program. Head Start classrooms service children ages three to five years who are from low-income families in the area. This collaborative research will analyze existing academic evaluations while focusing on variables that may influence students' academic performance: ethnicity, language, household, parent education, location, and classroom environment. Specifically, my research will focus on how a shared language and ethnicity between students and teachers can affect students' academic outcomes. This project allows for more insight into the effects of poverty on young children, opportunities to assist Madison area Head Start programs in understanding the sensitivity of the children they serve, and the consideration of new ways to enhance students' educational experiences.

## **SLITHERING DERIVATIVES: AFFINE SNAKES AND MULTI-SPACES**

Laura LeGault, Gloria Mari-Beffa (Mentor), Mathematics

A pressing concern in computer vision is the topic of object recognition. A common approach to this problem, particularly in medical imaging, is the use of affine snakes in combination with various edge-finding algorithms, which evolve curves in an image using Lie Group transformations. Analysis of these affine curves in the practical sense can be approached with a new method of invariantization applied to numerical analysis in the jet space. One can use Olver's multi-space construction to examine the foundation of the numerical differential equations underlying the curves. We construct numerical approximations of the differential invariants using an application of moving frame theory.

## **PRENATAL ANDROGEN EXCESS: ITS EFFECT ON BONE-LENGTH RATIOS IN FEMALE RHESUS MONKEYS**

James Lehman, David Abbott (Mentor), Obstetrics and Gynecology

In humans, finger-length ratios, “particularly those between the 2nd, 3rd, and 4th digits,” have been shown to correlate with prenatally determined androgen-linked phenotypes, including such disorders as testicular underdevelopment, congenital adrenal hyperplasia, and polycystic ovary syndrome. This study uses female rhesus monkeys as a model for the direct effects of prenatal androgen excess on finger-length ratios with the particular goal of exploring the validity of finger-length ratios as a biomarker of prenatal androgen exposure in primates. X-rays of prenatally androgenized infants were measured and analyzed in terms of known digit ratio data of humans, non-human primates, and other animals.

## **COMPUTATIONALLY EVALUATING THE EFFECT OF MUTATIONS ON THE BINDING AFFINITY OF THE SIR1/ORC1P COMPLEX**

Adeyinka Lesi, Julie Mitchell (Mentor), Mathematics

Computational models can be used to predict the effects of mutation on protein binding, and such models can save time and money over exhaustive experimental studies of mutagenesis effects. We used such a model to predict mutations in the sir1/Orc1p protein complex that improve the binding affinity of the complex by calculating a change in binding energy for each mutation using a thermodynamic free-energy perturbation cycle. Our method involved generating several snapshots of each protein in its different conformations and evaluating the properties of the protein using those samples. Our results will help direct researchers studying the role of sir1 and Orc1p in the formation of silent chromatin structures, which function to silence DNA in eukaryotic cells.

## **DOES ACCUMULATION OF URINE AND FECES IN SHOEBOX CAGES FOR LAB MICE CAUSE AN INFLAMMATION REACTION?**

Annabel Li, Jess Reed (Mentor), Animal Sciences

A previous study found unusually high levels of COX-2 proteins (an indicator of inflammation) in control mice, leading to this study's hypothesis that accumulation of urine and feces in shoebox cages elicits inflammatory responses. Mice were kept in three housing conditions (cage change once per week, three times per week and loft) for three weeks, and sacrificed eight hours after injection with either LPS to elicit an inflammatory response or saline as a control. The COX-2 analysis of lung tissues did not show differences between housing conditions, but COX-2 levels of LPS and saline injected mice were also similar. The timing of sacrifice may have missed the peak of COX-2 in LPS injected mice and this can be tested by a time study.

## **CHARACTERIZATION OF ZIIR ELEMENT OF BZLF1 PROMOTER IN CONTEXT OF WHOLE EPSTEIN-BARR VIRUS GENOME**

Hui Jun Li, Janet Mertz (Mentor), Oncology

Latent infection of Epstein-Barr virus (EBV) is associated with many human cancers. Induction of lytic replication of EBV may lead to destruction of these tumor cells. Expression of the viral immediate-early gene, BZLF1, plays a key role in switching EBV infection from latent to lytic replication. This gene is down-regulated by a potent silencer element, ZIIR. I constructed a ZIIR-mutant of EBV by mutagenesis of an EBV-derived bacterial artificial chromosome and introduced it into 293 cells, a human embryonic kidney cell line, to establish stable cell lines. An assay for infectious virus indicated spontaneous reactivation of the mutant. Immunoblot analyses and immunofluorescence staining are currently being performed to look for expression of viral gene products.

### **3-D TIME-LAPSE IMAGING OF MOUSE EMBRYONIC STEM CELLS**

Lindsay Ludeman, Jayne Squirrell (Mentor), Laboratory of Molecular  
Biology

In order to maximize the medical potential of embryonic stem cells, it is important that we understand more about their basic biology. I will be examining the processes stem cells utilize as they differentiate into multiple cell types. Cells in intact embryos use different patterns of cell divisions to generate cells with different fates. I will use 3-D imaging, over time, of stem cells with fluorescently labeled nuclei to record the patterns of cell division at different stages of differentiation. The data will be used to create stem cell lineages—a pedigree of cells and their progeny—to determine whether or not there is a relationship between the orientation of the cell divisions and differentiation status.

### **CARTOONING 9/11: CAN WE MAKE FUN OF EVIL?**

Alec Luhn, Farha Tahir, Tejumola Olaniyan (Mentor), English

September 11 has great historical, political, and cultural significance for all Americans, but its immediate effects were most pronounced in the work of political cartoonists, who had to comment on the inherently evil events with their usual critical wit and humorous images. This research seeks to understand how terrorism impacts the American social fabric and shapes cartoonists' ability to satirize society. We investigated cartoonists' responses by analyzing political cartoons in the *Capital Times* and *Wisconsin State Journal* in the months directly before and after 9/11 to understand the social norms that dictate when political satire is appropriate. Mirroring popular sentiments of anger and patriotism immediately afterward, cartoonists at first appeared unwilling to create funny cartoons, but their usual incisive humor gradually returned as the nation recovered.

## **BIOSAND WATER FILTER PROJECT IN RURAL UGANDA**

Kristie Lukas, Blair Means, Robyn Nusser, Christina Parpart, Kelli Truszynski, John Ferrick (Mentor), International Programs

Through the construction of BioSand Water Filters in homesteads in Southwestern Uganda, UW–Madison students participated in a service-learning project that will improve the drinking water quality of rural Ugandans. Students were responsible for developing educational materials, facilitating the attainment of construction materials and the assembly of each water filter through regular communication with contacts in Uganda, notably Professor John Kakitahi of the Makerere University Institute of Public Health. Students visited the region in December 2006/January 2007 as part of a CALS study abroad program to help build filters and educate villagers on their use and maintenance. This project gave UW students and faculty the opportunity to research and implement a service-learning initiative designed to remedy the devastating public health problem of unsafe drinking water.

## **IMMIGRANT ENTREPRENEURSHIP**

Tyler Marcus, Alfonso Morales (Mentor), Sociology

Immigrants who come from poor backgrounds have a major impact on the U.S. economy. My research consisted of collecting primary sources on immigrant entrepreneurship and on the success of different ethnic groups in entrepreneurship. The point of my research is to write a paper illustrating how the United States economy offers disadvantaged immigrants the opportunity to succeed through street markets and small business entrepreneurship, and how disadvantaged immigrant entrepreneurs are important to the growth of the U.S. economy. My oral presentation will focus on the entrepreneurship of immigrants from disadvantaged families in the United States and how some ethnic groups are more successful than others in entrepreneurship.

**SLEEP MODULATES CONSOLIDATION OF  
TYPICAL VERSUS ATYPICAL INFORMATION IN  
A NEW SEMANTIC LEARNING TASK**

Emily Mayberry, Timothy Rogers (Mentor), Psychology

Many types of learning have been shown to be sleep-dependent (e.g., visual-discrimination, motor skill learning), but studies of semantic learning variously find that sleep is either critical or irrelevant. The current study employed a new semantic learning task to investigate how sleep influences retrieval of category-typical versus atypical information. The results showed that sleep promotes memory for atypical information, whereas waking periods show the reverse effect. Thus the ambiguity in previous work may indicate differential effects of sleep on typical versus atypical items, rather than a lack of an effect of sleep. These results are consistent with the Complementary Learning Systems theory, which suggests that memories are “replayed” by the hippocampus during sleep to facilitate consolidation to the cortex.

**DIFFERENCES BETWEEN ZEBRA MUSSEL AND  
QUAGGA MUSSEL ATTACHMENT TO  
HARD SUBSTRATE IN CALM WATER**

Alice McCarthy, Carol Lee (Mentor), Zoology

Zebra mussels (*Dreissena polymorpha*) rank among the most destructive invasive species in North America, but quagga mussels (*D. bugensis*) may ultimately pose greater ecological threats. Quagga mussels are displacing zebra mussels throughout the Great Lakes, except possibly in habitats with high water velocity or wave exposure. Quagga mussels might not be able to establish in hydrodynamically stressful habitats, relative to zebra mussels, due to differences in byssal thread production and strength. Mussels synthesize protein structures called byssal threads to adhere to hard substrate in order to prevent dislodgement by hydrodynamic forces. I measured the number of byssal threads produced per day. Thus far my results support my hypothesis that, compared to quagga mussels, zebra mussels produce byssal threads at a faster rate.

## **WISCONSIN ATLAS OF MEDICAL RESOURCES**

Evangeline McGlynn, Mark Harrower (Mentor), Geography

In order to build tools to help evaluate the efficacy of the health-care system, we are preparing an atlas of Wisconsin's medical care providers (hospitals, clinics, and physicians in demographic context) along with datasets to encourage and support further analysis. This atlas will be unique in that it brings two data sets together, those from both hospitals and clinics, that do not currently exist together in any formal setting. The atlas, composed using Geographical Information Systems (GIS) technology, will graphically juxtapose the demographic differences and provider inventories between regional populations within Wisconsin for better informed examination, understanding, and decision making.

## **MATERNAL VARIABLES INFLUENCING DURATION OF BREASTFEEDING**

Anne McKechnie, Audrey Tluczek (Mentor), Nursing

Although a strong link between breastfeeding and positive health outcomes is well-established, low-income mother–infant dyads, who are at highest risk for poor health, demonstrate the lowest breastfeeding rates. Many women in this population participate in the Supplemental Nutrition Program for Women, Infants, and Children (WIC), and despite a growing percentage initiating breastfeeding, a low percentage continues to breast-feed, discontinuing in the first days or weeks. The Situation-Specific Theory of Breastfeeding (STB) postulates that breastfeeding decisions are influenced by maternal and infant readiness and capacity, as well as environmental support systems. Therefore, we hypothesize a positive correlation will exist between women's utilization of WIC services, as a support system, and breastfeeding duration. De-identified data from mother–infant dyads enrolled in the Green County, Wisconsin, WIC program between January 2006 and January 2007 will be analyzed. Recognizing maternal variables that may contribute to shortened breastfeeding will extend our knowledge about barriers among low-income, rural mothers.

## **PATIENT–PHYSICIAN INTERACTION**

Chase Meierotto, Betty Chewning (Mentor), Pharmacy

During patient and physician interactions, many questions arise. This study focuses on analyzing these questions and attempts to determine why these questions come up. Possible answers that the study considers are fear, personal interest, uncertainty, or misinterpreted information. This study analyzes patient questions by listening to conversations that have been recorded over time and by trying to categorize these conversations. As a subset of the study, patient questions associated with injections will be analyzed. The nature of the questions asked when a physician makes a suggestion will be categorized specifically. It is expected that there will be a pattern found among the questions, which will eventually help the questions to be properly categorized and addressed. The goal of this study is to help physicians eliminate some questions that arise and create a better understanding between patients and physicians.

## **INTERACTIONS OF LOWER-ACHIEVING MATH STUDENTS AND THEIR TEACHERS DURING ONE-ON-ONE PROBLEM SOLVING**

Azin Moghadam, Nancy Giles (Mentor), Waisman Center

In this study, we are investigating the interactions of lower-achieving elementary students and their teachers during one-on-one, mathematics problem-solving lessons. Each teacher ( $n = 11$ ) conducted a math problem-solving session with one of their lower-achieving students and, for comparison, a session with one of their higher-achieving students. Each session was audiotaped and videotaped. We are using Transana, a video analysis software program, and SALT, a discourse analysis software program, to transcribe and analyze each session. One focus of our analysis concerns times when students experienced problem-solving difficulty. Teachers and students also participated in individual interviews about the sessions and mathematics learning. We also are examining this data for differences related to students' mathematics achievement levels. This study has implications for instructional practices and educational policy.

## **ASSESSED INFANT AND PARENT BEHAVIOR AND AFFECT DESCRIPTIVE OF ATTACHMENT**

Jennifer Mohr, Julie Poehlmann (Mentor), Educational Psychology

This study looked at how the communication of emotional expressions between parent and child influences levels of mutuality, affect, and play in order to describe emerging attachments between parent and child. Participants of this study were a sub-sample of 128 preterm infant–mother dyads of a larger longitudinal study. The Parent-Child Early Relational Assessment (PCERA) and the Pediatric Infant Parent Exam (PIPE) were used to observe dyadic interactions. A neonatal health index was used to identify medical complications influencing infant and mother experiences. Results showed that mutuality and affect describe affectionate expressions demonstrated during play indicating associations between maternal sensitivity and dyadic interaction thought to predict attachment relationships. These findings can be used to inform further research and intervention programs.

## **BLACKENOMICS: A STUDY OF AFRICAN AMERICANS IN THE AMERICAN ECONOMY**

Mike Montgomery, Lydia Zepeda (Mentor), Consumer Science

This project delves directly into how important and vital products from the African American community and culture are for the economic shaping of America. It also exhibits how African American culture and lifestyle are bottled and sold as products to the American consumer. Blackenomics has its roots in slavery, tracing back to 300 years of free labor that greatly contributed to the economic basis of today's American society. Today, Blackenomics is exhibited in the entertainment industry, in which the faces, images, and culture of blacks are used in the packaging and selling of products, but the true owners are not African Americans themselves. This project will examine African Americans' roles in the past and modern economy, their contributions, and their struggles.

## **THREE-DIMENSIONAL RECONSTRUCTION OF THE FINAL STAGES OF CYTOKINESIS**

Olger Nano, Jayne Squirrell (Mentor), Laboratory of Molecular Biology

*Caenorhabditis elegans* (*C. elegans*) is a hermaphroditic nematode about 1 mm long that lives in soil environments. It is a great model organism for cellular biology and the study of cell division. During *C. elegans* embryonic cell division, as cytokinesis completes and the two daughter cells separate, we have observed the formation of a membrane cluster at the tip of the ingressing cleavage furrow. The ultrastructure of this cluster is visible with electron microscopy. Sequential electron microscopy images of this structure will be arranged using a special software program called “Reconstruct” to generate a three-dimensional structure of the membrane cluster and other components associated with the cleavage furrow.

## **CHARACTERISTICS AND CLASSIFICATIONS OF EVENTS IN THE GEOMETRIC SETTING**

Joseph Oldenburg, Amir Assadi (Mentor), Mathematics

To what extent does human discovery of the mathematics of geometry depend on the experience? Helmholtz, Henri Poincare, Einstein, and Gibson are pioneers in the theories of geometry as they arise from human interaction with the environment. We propose an empirical framework to explore the role of learning and memory in discovery of geometry from observation of events. The main idea is to design an intelligent system that discovers abstract properties of Euclidean and Riemannian geometry from physical experience despite presence of noise and other confounding factors in its environment.

## **EFFECTS OF CHLORPYRIFOS ON SPONTANEOUS ACTIVITY**

Amy Olsen, Dan Butz (Mentor), Zoology

Organophosphate pesticides are a widely used method for crop protection. However, the adverse effects of low doses of many pesticides have not been widely researched. Our research on Chlorpyrifos, an organophosphate pesticide, is to determine how varying exposure levels affect the spontaneous activity, specifically wheel revolutions, of laboratory mice. The mice are exposed to Chlorpyrifos in utero, in three exposure levels; 0, 1, and 5

mg/kg/day, 5 being the highest exposure level and 0 being the control group. The number of wheel rotations the mouse makes is recorded daily, throughout a two week experiment, and cumulative revolutions are reported. Our preliminary data shows that the low dosage group, 1, correlates with higher activity in males, while correlating with lower activity in females.

## **SUBCELLULAR LOCALIZATION OF ROS**

Rachel Orleck-Lubka, George Wilding (Mentor), Medicine/Clinical Oncology

Reactive oxygen species (ROS) are implicated in many diseases, including prostate cancer. Our laboratory and others have convincingly demonstrated that androgen induces ROS production in prostate cancer cells. We recently reported that androgen induced induction of polyamine oxidative pathway is one of the major sources of ROS production. While the role of ROS in prostate cancer development is well established, the actual mechanism of ROS induced carcinogenesis remains unknown. Many reports of ROS-induced DNA and protein modifications and their relationship with prostate cancer progression are available in the literature, but there is no consensus about the importance of one or more of these modifications in cancer progression. It is apparent that understanding the distribution of ROS in the cellular microenvironment is the key to elucidating the role of ROS in carcinogenesis and cancer progression. We used the BD Pathway Bioimager fluorescence microscope [Becton Dickinson, Rockville, MD] to quantitate ROS level in cytoplasmic and nuclear compartments of live LNCaP human prostate cancer cells treated with varying concentrations of androgen analog R1881 in a 96 well plate and observed at 37°C in a 5% CO<sub>2</sub>/Air atmosphere. The ROS level was quantitated from kinetic analysis of the green fluorescence of oxidized dichlorofluorescence diacetate (DCF), which was normalized with the blue fluorescence of cell nuclei stained with Hoechst 33342. It was observed that the ROS level increases with an increase in R1881 concentration as well as with the time of R1881 exposure. ROS initially generated in the cytoplasmic compartment redistributes to the nuclei between 24-96 after R1881 exposure. Possible implications of this observation in prostate carcinogenesis will be discussed. To the best of our knowledge, this is the first report of a reliable and reproducible method of determining relative changes of ROS concentration at different subcellular compartments.

## **GRAMMATICAL STRUCTURE OF LANGUAGE**

Allisya Otto, Jenny Saffran (Mentor), Psychology

This project studies how infants of sixteen to seventeen months learn the structure of language. During the experiment, children are exposed to a sound recording consisting of specific adjectives followed by particular nouns. After each sentence a corresponding picture appears in a specified area. As time progresses we expect the child to look to the side of the screen on which the picture will show up before the picture appears. The child's looking time and the direction of their eyes are then measured. Our preliminary results conclude that infants predict words in a stream of speech. This is an important observational test that could teach us how infants learn the very basics of the grammatical structure of their own language.

## **THE ATTACHMENT STORY COMPLETION TASK ADMINISTRATION GUIDE**

Kelli Packard, Julie Poehlmann (Mentor), Human Development and  
Family Studies

The Attachment Story Completion Task (ASCT) was devised to elicit young children's attachment representations through the use of dolls and various story stems. The basis of this project was to create an administration guide that would accompany ASCT training, allowing trainees to visualize the various stems as well as to learn how to maintain a neutrally supportive affect that is devoid of judgment. The administration guide includes both visual and written components in the form of a DVD that includes video clips from various ASCT administrations, as well as a manual that provides a detailed description of the strengths and weaknesses of the various clips. The ASCT administration guide is useful for anyone interested in learning more about the ASCT.

## **INTRINSIC MOTIVATION AND HEALTHY BEHAVIORS**

Jody Pankow, Diane Lauver (Mentor), Nursing

From self-determination theory, we proposed that when people are intrinsically motivated to participate in healthy behaviors, they are likely to do them. Our aims were to (1) describe the reliability of a motivation scale; (2) examine whether an intervention improved motivation; and (3) explore whether motivation was correlated with healthy behaviors. Nurses delivered a six-week intervention about intrinsic motivation and health behaviors. Participants ( $N = 52$ ) were community volunteers, primarily women with a college education. A six-item motivation scale and behavior measures (diet, activity) were administered pre- and post-intervention. The motivation scale was internally consistent. Most participants were intrinsically motivated pre- and post-intervention. Motivation scores increased but not significantly ( $p = .06$ ). Motivation scores changed significantly with fat intake ( $p = .04$ ). In future studies, more diversified samples and longer designs are recommended.

## **PHOSPHOLIPID ADSORPTION ON OXIDE SURFACES**

Rajarajan Panneerselvan, Nita Sahai (Mentor), Geology and Geophysics

Improving the biocompatibility of medical implants and devices will better promote cell adhesion and new tissue growth, and help prevent rejection by the host body. Such implants are often made of oxides or oxide-coated metals like titanium. The purpose of this research was to quantify adsorption of a cell-membrane phospholipid (PL) on oxide minerals. As part of this work, it was necessary to determine if the measured adsorption was affected by the particular solid-to-solution ratio in the experiment. This research was conducted by adding different amounts of solid oxide to batch PL solutions of equivalent volume, and then measuring PL adsorption on the oxides. In particular, amorphous silica and quartz ( $\pm\text{-SiO}_2$ ) were studied. Preliminary results have shown that variable particle loading does not significantly impact adsorption.

**CUIDANDOME, LOS CUIDO MEJOR  
(CARING FOR ME, I CARE FOR THEM BETTER)**

Rebecca Paradiso, Sandy Magaña (Mentor), Social Work

Cuidándome, Los Cuido Mejor (Caring for Me, I Care for Them Better) is a bilingual pilot intervention that aims to teach health information and improve health behaviors among Latina mothers caring for children with developmental disabilities. Previous research by Social Work Professor Sandy Magaña indicated that a similar participant population reported more depressive symptoms and health problems than women who did not have these responsibilities. The program is based on a promotora model, in which community members fluent in the culture and language of the participants administer the intervention. Pre- and post-tests will measure knowledge of health-related information and frequency of health behaviors. Our objective is that participants will develop a greater understanding of health-related information and practice positive health behaviors.

**CONTRIBUTION OF ENDOTHELIAL NITRIC OXIDE  
SYNTHASE (ENOS) POLYMORPHISM TO  
HEART FAILURE (HF) OUTCOMES**

Jahanvi Patel, Nancy Sweitzer (Mentor), Cardiology

Heart failure (HF) is a chronic disease with a progressive downhill course. While slow in some, it may rapidly progress to death in others. We will explore the relationship between variations in gene sequence (SNPs) and HF progression, focusing on eNOS. eNOS SNPs may alter physiology in patients with HF. Blood samples from up to 2,500 patients with HF will be analyzed. Clinical data are collected at baseline and follow-up documents clinical events. Ten percent of the population is homozygous for eNOS variants, and 40% heterozygous for variants. Our study will explore prevalence of these SNPs in HF patients, as well as relationships between SNPs and HF. We present baseline characteristics of the first 100 patients. Such studies allow doctors to individualize care and risk assessment in HF patients.

## **IDENTIFYING DEVELOPMENTALLY REGULATED GENES IN MOSQUITOES**

Roshni Patel, Que Lan (Mentor), Entomology

The purpose of this project is to identify developmentally regulated genes in the mosquito *Aedes Aegypti*, the primary vector of dengue and yellow fever. One gene in particular, Ae4-328, is found to have expressed itself in only adult female mosquitoes, pointing to its potential involvement in development from pupa to adult phase. Cloning and sequencing this particular unknown gene are essential to determining its specific function and mechanism. Methods used to accomplish this include polymerase chain reaction (PCR), gel electrophoresis, plasmid transformation, western blotting, and more. Determining the function of this gene could contribute to a better understanding of *Aedes Aegypti* development, as well as its ultimate inhibition, so as to prevent its transmission of deadly viruses that kill millions of people every year.

## **EFFECT OF BLOOD REMOVAL VIA PERFUSION ON LIPID OXIDATION IN TURKEY BREAST MUSCLE AND HEART TISSUE**

Chad Pendley, Mark Richards (Mentor), Animal Sciences

Lipid oxidation causes formation of off-flavors during storage of muscle foods. It is still unclear which components in muscle tissue cause lipid oxidation to occur. We hypothesized that residual hemoglobin was the main catalyst of lipid oxidation. We perfused turkey breast and heart tissue in an effort to remove hemoglobin and thereby inhibit lipid oxidation during storage. Hemoglobin content in tissue extracts was measured spectrophotometrically. Thiobarbituric acid reactive substances (TBARS) and lipid peroxides were used as indicators of lipid oxidation. Perfusion of breast muscle neither decreased the hemoglobin level in the tissue nor inhibited lipid oxidation. However, there was a statistically significant decrease in lipid oxidation in perfused compared to non-perfused heart tissue; perfused heart tissue was less red, indicating substantial removal of hemoglobin.

## **THE EFFECT OF REPEATED READING ON READING FLUENCY**

Gina Perez, Heather Reimer, Kimber Malmgren (Mentor), RPSE

This research looks at the effects of a repeated reading intervention on overall reading fluency. One of the most influential parts of a child's learning experience is the ability to read and comprehend. During our intervention the child reads a single passage three times, receiving constructive criticism after each. This is done as many times a week as possible. After the repeated reading the child also completes a one-minute timed reading, during which we record how many words he or she is able to read correctly in one minute. This tracks the child's progress. It is our hope that the four children we are working with will each show an improvement in reading fluency. The project is in progress but the preliminary results support our hypothesis.

## **ANGIOTENSIN II RECEPTOR DISTRIBUTION IN THE RAT BRAIN**

Courtney Premer, Mark Brownfield (Mentor), Comparative Biosciences

This study re-examines the distribution of Angiotensin (AT) receptor subtypes, AT1a, AT1b and AT2, in selected regions of the rat brain. Angiotensin is a potent vasopressor substance, increasing blood pressure, that also facilitates the regulation of sodium metabolism. Specific areas of the brain are sectioned then stained with antibodies so that the AT receptors are made visible when inspected under a photomicroscope. These regions are then mapped utilizing a rat brain stereotaxic atlas. Results will illustrate the specific parts of the brain where Angiotensin II effects may be exerted via each of these receptor subtypes. Upon finding the locations, this knowledge will be crucial in aiding patients affected by Angiotensin-linked diseases such as hypertension and kidney disease.

## **SEMI-SUPERVISED CLASSIFICATION IN HUMANS**

Ruichen Qian, Xiaojin Zhu (Mentor), Computer Science

We explore the connections between machine learning and human learning on semi-supervised classification. Human subjects completed 2-class categorization tasks in a psychology lab. The subjects were first taught to categorize a single example from two categories, and subsequently were asked to categorize additional items without feedback. The additional examples were sampled from a bimodal distribution with modes appearing either to the left or right of the two labeled examples. Early results showed that humans shift their decision boundary after exposure to unlabeled items similarly to the semi-supervised learning model in computer science. However, the human behavior differs from model predictions in other respects, suggesting a new direction for future inquiry.

## **CARDIAC HYPERTROPHY IN MOUSE MYOCYTES**

Avinash Rao, Meghan Reppen, Eugene Kaji (Mentor), Medicine

Cardiac hypertrophy is the process of cell enlargement to reduce wall stress. The purpose of this study is to determine the effect of the NFAT3 gene on the process of hypertrophy in mouse myocytes with the method of immunohistochemistry. We determine percentages of hypertrophied cells in wild-type (WT) and NFAT3 knock-out cells. In the whole animal, the NFAT3 gene suppresses physiological hypertrophy. By adding different levels of thyroid hormone (T3), we induce physiological hypertrophy in cell culture to see the gene's impact at the cellular level. This research has the potential to aid our understanding of the mechanisms behind the process of hypertrophy, thus allowing us to change pathological hypertrophy, a pre-cursor to heart failure, to the non-harmful physiological hypertrophy.

**TALES FROM THE REAL WORLD:  
A THEATRICAL APPROACH TO  
CRITICAL INCIDENTS IN MANAGEMENT EDUCATION**

Nicholas Remshak, Loren Kuzuhara (Mentor), Management and Human  
Resources

The primary objective of this research study was to identify specific challenges that recent graduates (1–5 years) of the University of Wisconsin School of Business have encountered while working in their current jobs in real world organizations. A secondary objective of the project was to utilize these real-world challenges as the basis for developing critical incident dramatizations (CIDs). These CIDs are scripted scenarios that recreate the specific challenges from the work experiences of recent business school graduates that include dialogue, props, etc. for current students to act out in traditional classroom settings. These critical incidents were obtained through both telephone and in-person interviews. Examples of CIDs will be presented along with practical guidelines for their utilization in the academic training of future business students.

**BIBLIOGRAPHY OF HINDU LAW AND DHARMASTRA**

Scott Resnick, Donald Davis (Mentor), Languages and Cultures of Asia

The Bibliography of Hindu Law and Dharmasastra was created to facilitate research within the legal fields of classical and modern Hindu Law. The project builds upon previous attempts to create a comprehensive bibliography, while introducing contemporary sources. This free resource intends to increase collaboration among historians and legal professionals, as well as feature a set of scholarly annotations. Utilizing a commercial database such as RefWorks allows entries to be added and viewed publicly, further promoting the cooperative nature of the project. More than 2,000 references have been entered into the database, and future growth is expected.

**DETERMINING THE LIFETIME OF THE  
INTERCELLULAR CANAL DURING  
LATE CYTOKINESIS IN C. ELEGANS EMBRYOS**

Kristin Riching, Jayne Squirrell (Mentor), Laboratory of Molecular  
Biology

Cytokinesis is the process by which a cell is cleaved in two. At the completion of furrowing, daughter cells are connected by an intercellular canal. To determine the lifespan of the canal during cytokinesis, a photoactivatable green fluorescent protein (PA-GFP) construct was made and expressed in the embryo of the nematode *Caenorhabditis elegans*. When PA-GFP is regionally activated with 413 nm light, it produces increased fluorescence when imaged with 890 nm two photon excitation. This provides a means for tracking the movement of biological molecules over time. Activation of PA-GFP at different times during furrow ingression will allow us to observe diffusion across the intercellular canal to determine the time frame during which the intercellular canal remains open.

**JUMPSTART: HELPING PRESCHOOL CHILDREN  
PREPARE FOR ENTERING SCHOOL**

Tiffany Roller, Julie Poehlmann (Mentor), Human Development and  
Family Studies

Jumpstart, an AmeriCorps program new to UW–Madison in fall of 2006, is designed to help preschool children from low-income backgrounds prepare for school. Jumpstart members include college students from many different backgrounds who commit to two semesters of service. Jumpstart members work in various preschool classrooms one on one with a child, assisting the teacher and doing volunteer work in the community. The goal of Jumpstart is to improve children's early reading and writing skills and to prepare them socially and emotionally for school. In my display I am going to go more in depth into what Jumpstart is and who is involved and I will present examples of children's progress from the beginning to the end of the year.

## **A SEASONAL STUDY OF DISSOLVED OXYGEN CONTENT AND MACROINVERTEBRATE POPULATIONS IN WILLOW CREEK**

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

Oxygen levels and benthic macroinvertebrate profiles are used to characterize water quality and general health of urban streams. To determine the health of the creek, these parameters were measured weekly in upstream and downstream sections of Willow Creek on UW–Madison’s campus from July 14 to October 15, 2006. Dissolved oxygen, measured in mg/L and % O<sub>2</sub> saturation, was low, with means of 4.3 mg/L and 49.4% saturation, and did not correspond with biological oxygen demand data. Macroinvertebrate species richness was 31 and showed no significant upstream/downstream difference. The majority of the organisms were classified as semi-sensitive to oxygen deprivation. Future studies will investigate the low levels of dissolved oxygen and unusual pattern of biological oxygen demand, testing water chemistry and using manipulative approaches.

## **CANCER SURVIVORS’ USE OF MASSAGE THERAPY**

Kristin Ryan, Diane Lauver (Mentor), Primary Care

Massage therapy (MT) can provide benefits to cancer survivors. We described reasons for and barriers to using MT. Using a descriptive design and convenience sample, we recruited 59 adult participants. Participants currently had or previously had cancer. We developed a questionnaire for this study and distributed it to midwestern community and clinic settings. Participants completed questionnaires and returned them in sealed envelopes. Among people who had MT after diagnosis, common reasons were to decrease physical effects of stress, increase relaxation, and decrease emotional stress. Among participants who never had MT, common barriers were lack of information, discomfort with touch, and never having considered MT. Findings suggest that some survivors use MT to cope with stress and some may lack information about MT’s benefits.

## **WATER SCARCITY IN THE MIDDLE EAST: WHY IT'S A PROBLEM**

Sheerlie Ryngler, Lydia Zepeda (Mentor), Consumer Science

The project explores the threat and complexity of a diminishing water supply to the Middle East. The objective is to highlight a crucial and often overlooked source of instability in the region. Water scarcity's role in the regional conflict is explored from a historical perspective and by examining how it affects the current situation from both the Arab and Israeli perspectives. The ongoing difficulties in obtaining an agreement on water rights and usage in the Middle East reflect and contribute to the larger Arab-Israeli struggle. The conclusion is that water scarcity is a major source of conflict in the region and plays a role in halting progress towards peace.

## **LAUGHING MATTERS: COMEDY AND DEMOCRATIC DISSENT**

Rocio Sanchez-Moyano, Richard Avramenko (Mentor), Political Science

Democracy requires checks on the government through criticism by the populace. Without it, democracy can become ruled by the powerful elite. Traditionally, philosophers have been the voice of democratic dissent, but recently, philosophers have lost prominence and influence: We no longer heed Socrates' critical voice. Nevertheless, as early as Aristophanes, comedy has been a critical voice in politics. This project argues that now, with the absence of philosophical voices, the comedian has taken a leading role in this necessary part of democratic politics. Comedy is an accessible medium that entices citizens to participate. Political issues' presence in comedy increases their visibility and opens the door for dissent. This project uses the "fake news" medium, primarily *The Daily Show* with Jon Stewart, to observe this.

## **ANALYZING VALIDITY AND RELIABILITY OF QUALITY OF LIFE MEASURES USED WITH CHILDREN WITH SPECIAL NEEDS**

Vorada Savengseuksa, Ruth Benedict (Mentor), Kinesiology

Children with cerebral palsy often experience spasticity and have problems with daily tasks, school tasks, movement, pain, and weakness. Furthermore, their fine motor functional skills can limit their performance in carrying out simple activities such as writing, grasping, pinching, etc. Due to these challenges, caregivers must assist children in performing some of these tasks. Many tools have been designed to measure the quality of life (QOL) for children with special health needs; however, there are limitations in existing measures. Our project will take a closer look at the different potential outcome measures for use with children having an intrathecal baclofen (ITB) pump. We want to determine if such measures are valid and reliable in measuring the change in QOL and improved fine motor function after ITB insertion. Our study will attempt to verify which of the available questionnaires are consistent and relevant to measuring changes in QOL due to the ITB treatment.

## **DIGIT RATIOS AS A BIOMARKER FOR PRENATAL ANDROGEN EXCESS**

Allison Schenk, David Abbott (Mentor), OB/GYN

Females prenatally exposed to excess androgen (PA) commonly experience negative side effects, involving a risk of developing Polycystic Ovary Syndrome (PCOS). This project is studying the effectiveness of digit length ratios, particularly the second and fourth (2D:4D) and third and fourth (3D:4D) digits, as biomarkers for determining the exposure of female fetuses to androgen excess. By measuring all phalanx bones in the right feet of 9 PA rhesus monkeys, I expected to find decreased 2D:4D or 3D:4D ratios in the PA compared to the control group ( $n = 6$ ). No significant findings in any of the digit length ratios in the right foot were found. However, in a similar study, a reduced 3D:4D ratio was established in the right hand in PA infants compared to controls.

## **EFFECTS OF INVASION BY EXOTIC SHRUBS ON TREE REGENERATION IN SOUTHERN WISCONSIN FORESTS**

Kaitlin Schott, Volker Radeloff (Mentor), Forest Ecology and Management

The spread of exotic species threatens natural ecosystems across the globe. Common buckthorn (*Rhamnus cathartica*), Bell's honeysuckle (*Lonicera x bella*), and Japanese Barberry (*Berberis thunbergii*) are exotic shrub species that have become serious invaders of temperate North American forests. To quantify the impact of these plants on tree regeneration, 32 paired plots were measured in the Baraboo Hills of southern Wisconsin. At each site regeneration, basal area, and percent cover by woody species was measured in both an area of intense invasion by exotic shrubs and a nearby un-invaded area of similar microclimatic, topographic, and edaphic conditions. Preliminary data analysis indicates a decrease in tree regeneration in areas of invasion by exotic shrubs, further emphasizing the importance of eradicating exotic shrubs.

## **SOIL AMENDMENT WITH SAWDUST AND CORN STUBBLE DECREASE INVASIVE WEED SPECIES IN THE BIOCORE PRAIRIE**

Neha Sehgal, Janet Batzli (Mentor), Biology Core Curriculum

Agricultural fields undergoing restoration to prairies are often nitrogen rich and foster weed over prairie plant growth. Past experiments indicate that sawdust soil amendments, which are carbon-rich and nitrogen-poor, can stimulate microbial activity, increase the nitrogen immobilization rate, and decrease invasive weed species growth. Pairing this rationale with the lack of information on the benefits of corn stubble soil amendments has inspired the question: Will a mixture of sawdust and corn stubble added to the soil hinder weed species and promote prairie plant growth? It is expected that the rapid reverse fertilization response expected from corn stubble combined with the delayed but more long-term effect of sawdust will stimulate a more conducive environment for prairie plants.

## **THE EFFECTS OF THE PROTEIN HNRNP R ON THE TRANSCRIPTIONAL ACTIVITY OF THE THYROID HORMONE RECEPTOR**

Ashley Setala, Eugene Kaji (Mentor), Medicine

Thyroid hormone mediated hypertrophy, characterized by a thickening of the heart muscle, is a precursor to heart disease. My laboratory seeks to find proteins potentially involved in the causation of cardiac hypertrophy. Previously, a yeast-two hybrid assay was performed to identify proteins working in conjunction with the thyroid hormone receptor (TR $\pm$ ). One protein found to interact with TR $\pm$  is the heterogeneous nuclear ribonucleo-protein R (hnRNPR). Currently, I am learning more about hnRNPR. I wish to find the effects of hnRNPR on the transcriptional activity of TR $\pm$  by transfecting the protein and quantifying expression levels with a luciferase assay. To determine cellular localization, I will halotag the protein. Finally, a Northern blot assay will determine in which organs hnRNPR is expressed.

## **ACTION FOR ENVIRONMENTAL JUSTICE SERVICE PROJECTS**

Michael Shepherd, Matthew Smith, Andrea-Teresa Arenas (Mentor),  
Letters & Science

Our student organization, Action for Environmental Justice, works to address issues of environmental pollution as it disproportionately affects communities of ethnic minorities, the economically impoverished, and the otherwise disenfranchised. To do this we are designing two projects. First, in the ninth ward of New Orleans, we will be working on a wetlands restoration project to help address the inequitable environmental situation that has been thrust upon the local community. Second, to address the pressing issues of water scarcity and environmental pollution along the U.S.-Mexico border, we are planning a residential septic system in Matamoros, Mexico, to help this severely disenfranchised region.

## **NEURAL PATHWAYS MEDIATING THE ACTION OF AN ANOREXIGENIC SEROTONIN AGONIST IN THE APPETITIVE CIRCUIT**

Hayley Silver, Mark Brownfield (Mentor), Comparative Biosciences

We hypothesize that an anorexigenic drug inhibits feeding by stimulating inhibitory neurons in the brain appetitive circuit in rats that control feeding. These 5-HT receptors respond to different stimuli mediating hypophagia or hyperphagia. To locate these receptors, c-Fos, a nuclear transcription factor of neuronal excitation, is used to map neurons bearing 5-HT<sub>2c</sub> receptors or their downstream neuronal targets. Initially we will map this circuit with c-Fos immunocytochemistry. After this pathway is labeled, samples will be counterstained for specific neurotransmitters. Candidate neurotransmitters are those known to be important in the feeding circuit. These may include melanocortin, proopiomelanocortin, orexin, neuropeptide Y, and norepinephrine. The goal of these studies is to synthesize drugs that target the inhibition of feeding more precisely than those currently on the market.

## **BLACK PRESS COVERAGE OF HURRICANE KATRINA**

Jacqueline Smith, Hemant Shah (Mentor), Journalism and Mass Communications

This project involves analyzing new coverage of Hurricane Katrina by the black press. About 300 articles from several black publications were examined by thoroughly reading each article to determine the main topics of emphasis, the main actors involved in the news, and the race and gender of sources used by reporters. We will compare the black news coverage with Hurricane Katrina coverage by the mainstream press to see whether there are different patterns of coverage by the black press and mainstream press. We predict that the black press will be more sympathetic to the victims of the disaster.

## **THE 2D:4D RATIO AS A RETROSPECTIVE BIOMARKER FOR FETAL EXPOSURE TO EXCESS TESTOSTERONE**

Nancy Stevens, David Abbott (Mentor), OB/GYN

A rhesus monkey animal model for polycystic ovary syndrome (PCOS) exhibits human symptoms including polycystic ovaries and high circulating testosterone levels. However, there is little research on digit length ratios as diagnostics tool for PCOS. The 2D:4D ratio is a possible retrospective biomarker for excess fetal testosterone in humans with congenital adrenal hyperplasia. The effect of in-utero testosterone excess on the 2D:4D ratio and reproductive health of female rhesus monkeys was tested. Nine of 15 fetuses received subcutaneous injections of testosterone propionate early in gestation. The hands of all 15 infants were necroscopied and x-rayed, and digit lengths were measured. If the ratios between digit lengths of exposed monkeys are significantly masculinized, data will confirm digit length ratios as retrospective biomarkers for excess fetal testosterone exposure.

## **QUANTIFYING SPECIFIC EGG YOLK ANTIBODY RESPONSE OF LAYER HEN**

Ashley Swanson, David Trott (Mentor), Nutritional Sciences

Hen egg yolk contains 150mg of immunoglobulin (IgY), and 1–10% of total IgY can be directed through immunization. For comparison with previously reported results, the amount of egg yolk antibody produced in response to immunization against phospholipase A2 (PLA2) was quantified. Hens were injected intramuscularly with 3mg PLA2 emulsified in 1mL of 50:50 mixture of phosphate buffered saline (PBS) and Complete Freund's adjuvant. Booster injection containing antigen in Incomplete Freund's adjuvant was administered seven days after initial injection. Polyethylene glycol extraction was used to purify total IgY. Affinity-chromatography was used to purify PLA2-specific antibody. Total IgY (8.5mg) and affinity-purified PLA2 antibody (1.06mg) was determined by Bradford assay. PLA2-specific antibody (12.5% of IgY) was greater than the previously reported values of 1–10% directed through immunization.

## **SUSTAINABLE INTERIOR DESIGN CASE STUDY: RESIDENTIAL KITCHEN**

Danielle Tallman, Suzanne Scott (Mentor), Environment, Textiles and Design

The purpose of my research project is to advance, apply, and share my knowledge of creating environmentally friendly interior spaces. By attending international conferences, interviewing design practitioners, researching online, and reading numerous books and articles, I have gathered information to guide my application of sustainable-design principles to a case study project: a residential kitchen. This design project demonstrates how sustainability issues, such as energy consumption, off-gassing, and waste, can be dealt with in a manner that achieves both functionality and beauty. This project furthers my own abilities with regard to sustainable design, and provides an educational tool for teaching green design in future interior design classes.

## **QUANTITATION OF VASOPRESSIN CONTENT IN RAT BRAINS BY A NEW ELISA**

Haider Tamton, Mark Brownfield (Mentor), Comparative Biosciences

ELISA (Enzyme-Linked ImmunoSorbent Assay) is a technique used to measure the amount of a substance in a particular sample. The method requires a specific antibody against the substance of interest, and the substance in labeled and unlabeled forms. This ELISA is a competitive antibody binding assay that measures vasopressin in biological samples. The ELISA was developed by sequentially coating well plate with “trap” antibody (Goat Anti-Rabbit IgG), rabbit anti-vasopressin, Biotinylated vasopressin, and Avidin-Peroxidase complex as the color producing reporter molecule. Using the data we were able to produce a sensitive standard curve. This technique will then be used to study biological samples of fluid and tissue extracts.

## **DNA CROSS-LINK REPAIR IN ESCHERICHIA COLI**

Meng Kwang Marcus Tan, Michael Cox (Mentor), Biochemistry

In vivo, Mitomycin C (MMC) creates cross-links in DNA that prevent opening of the duplex and can lead to cell death. The RecA protein of *Escherichia coli* (*E. coli*) is involved in repair of DNA interstrand cross-links, and strains harboring the RecAC17 mutation are more sensitive than Wild Type (WT) *E. coli* (1). Previous work using transposon mutagenesis of the RecAC17 strain resulted in mutations that suppressed the MMC sensitivity of the RecAC17 mutation. This project will identify suppressor mutations by chromosomal mapping and sequencing. These data will provide insight into the components and mechanism of interstrand crosslink repair in *E. coli*, which are currently not well understood.

## **VALIDATING NEW BIOMARKERS FOR PROSTATE CANCER**

Melissa Taylor, Wei Huang (Mentor), Pathology

Prostate cancer is the most common cancer for men in the United States, and there are indolent courses and aggressive courses. Indolent courses are generally not life-threatening. A biomarker is a protein expressed by the cells, either on the surface or within the cells. The expression of a biomarker may be up-regulated or down-regulated in a disease process. Many new biomarkers associated with prostate cancer progression have been reported, but their significance has not been established. The purpose of this research is to confirm those potential biomarkers that may be useful in predicting aggressive prostate cancer. Prostate cancer cases from UW Pathology archive from 1990 to 2000 will be reviewed. A data table will be created recording the Gleason score, tumor volume, and spread of cancer. From this table researchers can create tissue microarrays which will be used to validate specific biomarkers.

## **THE EFFECT OF ROLIPRAM AND MACROPHAGE ACTIVATED MEDIUM ON FUNCTIONAL RECOVERY FOLLOWING SPINAL CORD**

Jessica Tilghman, Gurwattan Miranpuri (Mentor), Neurological Surgery

Spinal cord injuries result in the damage of nerve axons and thus a loss of movement and sensation below the injury site. Spontaneous regeneration of axons is currently not possible. However, specific unknown factors secreted by macrophages, as well as the elevation of cAMP by administration of rolipram, independently promote axonal regeneration. In the present study, we examined the effect of simultaneous activated macrophages and cAMP elevation using a rat model. Animals received a laminectomy followed by spinal cord contusion. Rolipram and macrophage conditioned media were administered to the rats. Functional recovery was then assessed using BBB locomotion rating scale. We have shown that the administration of rolipram and macrophage activated media seven days post-spinal cord injury hinders functional recovery.

## **TESTING MILK PRODUCTION TRAITS WITH THE PEG 3 GENE**

Amanda Tran, Hasan Khatib (Mentor), Dairy Science

Milk production ratings are used to guide further breeding. It takes years to evaluate the true genetic value by progeny testing bulls. Newer methods to evaluate cattle are needed to help breeders accurately select animals at the phenotypic and genetic level. The specific objective of this project is to test PEG 3 gene's association with milk production traits. There are four main experimental methods that we will use: DNA extraction from milk samples, identification of different alleles of PEG 3, collection of phenotypic data, and association of gene variants with phenotypes for production using standard polymerase chain reaction. Economic values of this study could come from the potential marker-assisted selection program to shorten generation intervals and to reduce the costs of progeny testing.

## **COMPUTER GAMING AND IT FLUENCY**

Tyler Tucker, Betty Hayes (Mentor), Curriculum and Instruction

Educators have speculated that information technology (IT) fluency can be enhanced through practices associated with computer gaming. Professor Hayes and I are researching this idea, examining the kinds of skills that are acquired through game-related content creation. For my contributions, I have become a subject to study how a person learns to use new software and what skills/knowledge are gained from it. My project consists of taking a video game and manipulating it so that I can create a machinima. By keeping a log, we are able to study how people teach themselves. From this, we hope to develop a better understanding of the skills and knowledge that can be developed through content creation, as a basis for incorporating game-based IT learning into formal educational settings.

## **ANTIOXIDANT DEPLETION AND DRUG HYPERSENSITIVITY**

Casmir Turnquist, Lauren Trepanier (Mentor), Medical Sciences

Antioxidant deficiencies, common in HIV-infected patients, may cause allergic reactions to sulfonamide antibiotics. Preliminary studies suggest that a breakdown product of sulfonamides, the nitroso metabolite, prompts an abnormal immune response. Vitamin C and glutathione (antioxidants) reduce the nitroso metabolite. Therefore, we are investigating whether deficiencies in these antioxidants increase the risk of hypersensitivity to sulfonamides. To test this hypothesis, guinea pigs are fed a normal or vitamin-C restricted diet, with or without a drug that prevents the production of glutathione, and then dosed with the nitroso metabolite or a placebo control. The animals are then monitored for signs of clinical illness. By determining whether nitroso is associated with sulfonamide hypersensitivity, we will be able to formulate strategies for preventing and treating this adverse drug reaction.

## **PROTEIN LIGAND DOES NOT EXHIBIT HEPATOCTE TARGETING SPECIFICITY IN IN VITRO CELL BINDING ASSAYS**

Benjamin Van Treeck, Jon Wolff (Mentor), Pediatrics and Medical  
Genetics

In recent years, elucidating hepatocyte targeting peptides has become a major research activity because of the potential benefits derived from the hepatic targeting of gene therapies and medicines. One such peptide that was initially screened *in vivo* for hepatic targeting exhibited potential hepatocyte targeting specificity with 8% uptake of the input (Ludtke et al., 2006). This peptide is a mutant of the tail fiber of bacteriophage T7, called clone 2-41. However, upon further investigation using *in vitro* hepatocyte cell binding assays, the clone failed to demonstrate hepatocyte targeting capability.

## **GLUCAGON-LIKE PEPTIDE 2 (GLP2) RESPONSIVE NEURAL PATHWAYS**

Paj Ntaub Vang, Mark Brownfield (Mentor), Comparative Biosciences

Glucagon-like peptide 2 (GLP2) is a peptide in the incretin family of peptides which is released by gut cells during feeding. When administered intraperitoneally, GLP2 activates brain neural pathways in regions known to control feeding behavior as shown by *cfos* immunocytochemistry (ICC) in the hypothalamus and hindbrain. We intraperitoneally injected GLP2 and used light microscopic immunocytochemistry to map the expression of brain nuclear *cfos* protein. This is a marker of neuronal activation, which is seen in neurons bearing GLP2 receptors or downstream target neurons in the circuit. We will use double-label ICC to identify the neurotransmitter employed by some *cfos* labeled neurons. These studies will help to identify neurochemical targets to limit feeding behavior.

## **THE INTERSECTIONS OF RELIGION AND DOMESTIC VIOLENCE**

Desire Vincent, Pee Yang, Shane Sharp (Mentor), Sociology

In this research project we are investigating the influence of religion in the lives of intimate partner abuse victims. This project will look at how victims use religion to comprehend and justify their abusive experiences, how religion helped them cope with abuse, how their religious beliefs changed as a result of the abuse, and whether their religious beliefs or fellow religious community members aided or prevented them from seeking assistance. To find these answers, we conducted in-depth interviews with religious and non-religious victims. We hope that the findings from this research can broaden the theoretical issues in sociology and social psychology such as identity maintenance and social actors' strategic use of culture.

## **THE RESPONSE OF CONDITIONED SCARLET DROSOPHILA MELANOGASTER MUTANTS TO ATTRACTANTS AND REPELLENTS**

Matthew Vogt, Julius Adler (Mentor), Biochemistry

The response of *Drosophila melanogaster* to external stimuli is a result of higher-order brain functioning in this organism. The goal of this study is to test the response conditioned mutants at 37°C, from the scarlet parent of *D. melanogaster*, to various stimuli to determine if flies are defective in central processing, which is the inability to exhibit the phenotypic behavior of a normal fly to attractants and repellents. I will use light as the attractant and benzaldehyde as the repellent in two test-tube assays and compare the behavior of mutant flies to wildtype flies. The central processing genes of such *D. melanogaster* mutants could yield information about higher order brain function in more complex organisms such as mice and humans.

## **BLADDER CANCER BIOMARKERS**

Shrinal Vyas, Wei Huang (Mentor), Pathology

Biomarkers, such as matriptase and its cognate inhibitor HAI, EZH2, and E-cadherin, were reported to be involved in tumor progression in many cancers, such as ovarian, breast, bladder, and prostate cancer. This study aims to better understand bladder cancer behavior. Data was gathered from hundreds of patients with urinary bladder cancers. The patients' cancers were in various stages and had many differentiations. These differences are associated with patients' outcomes. Paraffin-embedded bladder cancer tissue blocks of cancer patients will be pulled from a pathology archive to construct a tissue microarray (TMA). Hundreds of bladder cancer patients' TMAs will be assembled. Then the biomarkers will be studied on the TMA to see if any of the biomarkers play a role in tumor progression. The study may provide insight into the cancer's behavior. The biomarkers may help understand and predict cancer aggressiveness and predict patients' prognosis.

## **GENERATION OF INDUCIBLE TRANSGENIC MICE FOR STUDYING T-CELL RESPONSES IN CNS AUTOIMMUNE DISEASE**

Charlotte Ward, Zsuzsanna Fabry (Mentor), Pathology

The goal of our experiment is to generate Cre<sup>+</sup>OP double transgenic mice, in which the production of ovalbumin (OVA) in oligodendrocytes is inducible. Molecular techniques, such as DNA isolation, PCR, and gel electrophoresis, will be employed to screen transgenic mice. Following induction, double transgenic mice will overproduce the OVA protein in the CNS, which may lead to the proliferation of OVA-specific T-cells, the accumulation of T-cells, and demyelination in the CNS. To test this hypothesis, EAE, a mouse model of multiple sclerosis, will be induced in these mice. The clinical score of these mice will be recorded, and infiltration of T cells and demyelination in the CNS will be analyzed immunocytochemically. Successful completion of this experiment will provide valuable therapeutic information for multiple sclerosis.

## **PERCEIVED COMPETENCE AND HEALTH ACTIONS**

Padau Yang, Diane Lauver (Mentor), Nursing

Many people do not take appropriate actions for their health; only 24% engage in exercise more than three times weekly (<http://www.cdc.gov/>). From self-determination theory, people have an inherent need to perceive themselves as competent in their actions. Our aim was to examine whether perceived competence (PC) was related to health actions. In a pre–post-intervention design, nurses delivered a six-week intervention to foster PC and health actions. Participants ( $N = 52$ ) from Midwest clinics were mostly female with baccalaureate degrees. They completed a four-item PC scale and health action scales (activity, diet) pre–post-intervention. The four-item PC scale was reliable. Pre- to post-intervention differences in PC scores were not correlated with differences in health actions. Findings may be due to the relatively homogenous sample and short intervention.

## **SYNCHRONIZATIONS AND DYNAMICS IN LHRH-1 NEURONS**

Filiz Yucebay, Amir Assadi (Mentor), Mathematics

LHRH-1 neurons, or Luteinizing hormone releasing hormone, are neuro-hormones that control the release of Luteinizing hormone (LH) from the anterior pituitary gland in the hypothalamus. The amount of hormone that is released is controlled by the size and frequency of the pulses from the gland. These oscillations are controlled by internal calcium concentrations inside the cells. Data was taken from the oscillations of the LHRH-1 neurons and calcium signaling to develop a model for the synchronization patterns of the neurons. Techniques of Fourier Transform and wavelets were used to analyze the signals and create mathematical models called networks. Thus, an adequate hypothesis of the mode of synchronization of the neurons was developed.

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