

ABSTRACTS 2012



Undergraduate Symposium

Celebrating research,
creative endeavor and
service-learning



WISCONSIN
UNIVERSITY OF WISCONSIN-MADISON

Undergraduate Symposium 2012

Celebrating Research, Creative Endeavor and Service-Learning

Abstracts

University of Wisconsin–Madison
April 18, 2012
Union South



A Special Thanks!

We would like to thank the faculty and staff for promoting academic and creative excellence and for making the Undergraduate 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.

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Undergraduate Symposium 2012

Celebrating Research, Creative Endeavor and Service-Learning

University of Wisconsin–Madison
April 18, 2012

The 14th annual Undergraduate Symposium is a celebration of undergraduate students' accomplishments across the many schools and colleges at UW–Madison. The Symposium includes presentations, posters, performances 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.

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Congratulations!

The Undergraduate Symposium has become the premier campus-wide event showcasing our students' incredible talents in research and scholarship, creative works, and community involvement. I want to congratulate you on your achievement, and I want to encourage you to explore the accomplishments of your colleagues. Look through this abstract booklet and take a look at others' work presented and displayed throughout the Union today.

We take great pride in what you have done and take every opportunity to brag about you. Former Symposium presenters have gone on to brilliant careers in academia, law, medicine, business, the arts, and the sciences. We look forward to hearing what you accomplish next.

Again, congratulations and enjoy the day!

Aaron M. Brower, Ph.D.
Vice Provost for Teaching and Learning
Professor, School of Social Work
Harold C. Bradley Faculty Fellow

STROKE RECOVERY

Allison Abellaneda, Hongwu Zeng (Mentor), Radiology

Stroke is the sudden death of brain cells due to inadequate blood flow. Basal ganglia, associated with motor control, cognition, emotions, and learning, consists of the most common affected structures. This study evaluates the difference in volume of these structures between stroke patients and normal controls, and also tests correlation between volume decrease and function loss. Using images of the brain acquired through Spoiled Gradient Recalled Sequence and a program called MRICroN, tracings of basal ganglia structures facilitate comparison between stroke patients and normal controls, to test correlation between the volume decrease and the function loss. Ultimately, we want to restore function to stroke patients by establishing a customized rehabilitation plan, so a satisfying quality of life can be experienced.

HUNTING FOR FLAVIVIRUSES: DESIGNING A DIAGNOSTIC RT-PCR FOR DETECTION OF MOSQUITO INFECTIONS

Axel Adams, Tony Goldberg (Mentor), Pathobiological Sciences

Three-quarters of emerging diseases are zoonotic and many of these are arthropod-borne. Flaviviridae contains many important arthropod-borne viruses such as West Nile virus (WNV) and Yellow fever virus and also includes a class of recently-discovered insect-specific flaviviruses, such as Culex flavivirus (CxFV). CxFV has been shown to co-infect with WNV in Culex pipiens mosquitoes in Chicago, IL. Using RT-PCR, annual data from the field, and the knowledge that flaviviruses exhibit significant nucleotide conservation of the NS5 gene (which encodes the viral polymerase), we developed a nested set of generic RT-PCR primers for the detection of mosquito-borne flaviviruses that may be co-circulating in Chicago, IL. This should enhance the discovery of novel flaviviruses while facilitating studies of co-infection and virus ecology.

CHALLENGES IN FAMILY BUSINESS

Luis Aldana, Debra Holschuh-Houden (Mentor), Business Outreach

When family members work together, emotions may interfere with business decisions. Conflicts may arise as relatives see the business from different perspectives. I will examine two family business Los Gemelos and Taqueria Guadalajara and look at potential problems that businesses face. The job of family manager may be complicated by relatives who must be reconciled to working together in a business. I will conduct a survey focusing on the current issues that both family business face and recommendations to each to see where they are with their practices. There are no simple or quick solutions to the unique challenges faced by family businesses. This project will conclude with recommendations for each business to accomplish goals and provide for orderly succession.

MONOMERIC VS. MULTIMERIC PROPERTIES OF SWEET TASTE RECEPTOR T1R2 SUBUNIT PROTEIN

Maxwell Alexander, Fariba Assadi-Porter (Mentor), Biochemistry

The human taste receptor (hT1R) is composed of two subunits, hT1R2 and hT1R3, and allows the human body to detect and respond to sweet substances, including sugars and artificial sweeteners. To understand the interactions of hT1R2-T1R3 heterodimers with sweet ligands, it is necessary to express the physical properties of proteins by a heterologous expression system such as E. coli. We have expressed the hT1R2 protein in E. coli and are studying the various quaternary structural multiplicities of the protein by fast protein liquid chromatography (FPLC) gel filtration. This study aims to determine the monomeric vs. multimeric properties of the hT1R2 subunit protein through FPLC gel filtration studies and its binding properties through saturation transfer difference (STD) NMR binding assay to test for activity by binding of ligands, and whether the monomeric subunit may be analyzed through NMR spectroscopy.

EARLY PREDICTORS OF TREATMENT SERVICES FOR CHILDREN WITH AUTISM SPECTRUM DISORDERS

Sarah Allen, Susan Ellis Weismer (Mentor), Communicative Disorders

Predictors of treatment services and educational outcomes at age 5 were examined for 103 children on the autism spectrum. Age 2 predictors included nonverbal cognition, autism severity, receptive and expressive language, maternal education, and geographic location. Service outcomes included speech and language therapy hours, intensive autism therapy, and general education placement. Maternal education and geographic location were not significantly correlated with outcome variables. Receptive language at age 2 negatively predicted participation in intensive therapy at age 5, controlling for expressive language, nonverbal cognition, and autism severity at age 2. Receptive and expressive language at age 2 predicted hours of speech and language therapy received at age 5. This research adds to the literature on treatment services and educational outcomes for children with autism spectrum disorders.

PATTERNS TO POLYNOMIALS ASSOCIATED WITH PARTITIONS

Ayah Almousa, Melanie Wood (Mentor), Mathematics

The purpose of this research is to find a pattern to polynomials that describe certain sets of numbers called partitions. Many of these polynomials are of the form $L^{|p|}$, where $|p|$ refers to the number of elements in the partition p , but there are many exceptions; the goal is to find an infallible pattern to the partitions with polynomials of the aforementioned form. Using Maple code, many of these polynomials are generated and analyzed; any apparent patterns are documented with the intention of being rigorously proven. The resulting patterns will help mathematicians better understand the geometry of configuration spaces, which are used in physics to describe the configurations of particles. This research has an additional application to describing the multiplicities of roots of polynomials.

THE INFLUENCE OF PROXIMITY TO ENVIRONMENTAL HAZARDS ON PERCEIVED RISK: A LITERATURE REVIEW

Scott Andre, Dolores Severtson (Mentor), Nursing

Proximity to environmental hazards, on the ground or viewed on maps, influences risk beliefs, protective behaviors and ultimately health outcomes. The influence of proximity upon risk beliefs and behavior was assessed through literature review. Overall, the relationship between proximity and risk beliefs was under-examined. Proximity to hazards had varying levels of influence on beliefs. In most studies, nearness to a hazard related to stronger risk beliefs, proximity related to weaker beliefs in several others, some showed no relation. Few studies examined the influence of proximity on behaviors. Results suggest the need for consistent definition of proximity. Differences in methods used to quantify proximity make comparison difficult. Critical examination of each measure's ability to explain proximity-based variance in risk beliefs and behavioral responses is warranted.

PRE-SURGICAL PLANNING FOR TUMOR PATIENTS: EFFECTS OF TASK AND THRESHOLD ON LANGUAGE LATERALIZATION

Matthew Andreoli, Veena Nair, Peng Yin, Mary Meyerand (Mentor), Medical Physics

Functional Magnetic Resonance Imaging (fMRI) is a non-invasive pre-surgical tool used for mapping task-related brain activation. This study's objective is to investigate the effect of variable statistical threshold on functional activation patterns and language lateralization. Imaging data was collected from 50 tumor patients (average age 48) who performed receptive and expressive language tasks in the scanner. Preliminary analysis shows that calculating lateralization index (LI) at different thresholds has more effect on expressive language functions: as p-value becomes more stringent, change in LI is greater. Results suggest that the threshold effects on LI may be task-specific and that applying variable threshold to examine LIs may be an effective method for identifying critical functional regions, providing surgeons a better estimate of the extent of tumor resection.

CONTEMPORARY LANDSCAPE

Yolanda Arellano, April Arevalo, Lauren Arndt, Jacob Berchem, Anika Carlson, Celia Carroll, Jessica Casper, Allyson Craft, Alexandria DePagter, Kateryna Gudziak, Alexander Jackson, Jamie Jacobson, Emma Kane, Kelly Kaschner, Kimberly Kirt, Emily Leggee, Jeremy Mendoza, Michelle Morgridge, Nastassja Muchin, Andrew Olson, Conlan Parkman, Kier Pfuehler, Lauren Richards, Catie Rutledge, Katherine Sandheinrich, Emily Shullaw, Maddie Smith, Ashley Stromberg, Andrew Thompson, Ella Williquette, Emma Wimberley, Mafia Yang, Thomas Berenz (Mentor), Trina Smith (Mentor), Art

The Union Theater Gallery showcases an exhibit on "Contemporary Landscape". This show captures the spirit of the landscape in a contemporary context, featuring student works by Art Majors in foundations Drawing II. These students/artists lead the viewer in a journey of metaphorical contemplation over the message about interdependence of nature and culture within

a highly technological and political environment. Each student responded to the notion of “landscape” in a different way, exploring their relationship to or their ideas about the world around them. This show enters into the current discussion by contemporary artists to not only challenge the traditional trajectory of art history, but also to comment on the social and political forces that shape our surroundings.

A BEETLE'S LOST WAY: A STOP MOTION ANIMATION FILM

April Arevalo, Jennifer Angus (Mentor), Design Studies

The purpose of this project is to showcase the media of insects in their use in design patterns and art installations. A stop motion animation film is a succession of images at a high speed, of a certain object or objects to make it appear as if it is performing an action. The concept of the film is a lonely beetle getting engulfed in a dark forest. After choosing our "actor" we storyboarded the scenes and captured images of each movement. The final part was editing the images and adding a soundtrack. In creating this film, a rare media and art form were demonstrated to gain new appreciation and recognition.

MOLECULAR MECHANISMS OF INCREASED SENSITIVITY TO RADIATION IN HUMAN PAPILOMAVIRUS POSITIVE HEAD AND

Tim Baerg, Randall Kimple (Mentor), Human Oncology

Purpose: Patients with (HPV)-associated head and neck squamous cell cancers (HNSCC) have greater survival compared to those with traditional tobacco and alcohol-associated cancers. To optimize therapy for patients with each type of cancer, we investigated underlying molecular differences between HPV+ and HPV- HNSCC. Methodology: Baseline levels of signaling proteins were investigated by western-blot in established HPV+ and HPV- cells. Results: EGFR expression was higher than expected in four HPV+ HNSCC cell lines. p53 expression was low in 3 of 4 HPV+ cell lines. EGFR activation was seen following radiation in both HPV+ and HPV- HNSCC. Conclusion: By comparing protein levels in both HPV+ and HPV- HNSCC, it is possible to better understand how to personalize therapy for these different diseases.

ECOLOGY OF THE EARLIEST EUTHERIAN MAMMAL

Nicole Baker, Warren Porter (Mentor), Zoology

The fossil mammal, *Juramaia sinensis*, from China indicates that eutherian mammals diverged as early as 160 mya. The purpose of this research is to reconstruct the ecological fundamental niche for this fossil species. ZBrush® and Rhinoceros® were used to create a 3-D image of the 2D fossil image. Hourly energetics over a year in the animal's life will be calculated separately for an assumed nocturnal, then diurnal activity pattern using Niche Mapper™, a state-of-the-art microclimate and endotherm mechanistic model developed at UW Madison. A sensitivity analysis for fur length will also be conducted using the porous media fur model in Niche Mapper. Goals of this research are to determine daily metabolic cost and water loss, food requirements and activity hours available for foraging and activity.

EOSINOPHIL ASSOCIATED NUCLEOTIDASE ACTIVITY IN PERIPHERAL BLOOD AND ASTHMATIC AIRWAY LAVAGE SAMPLES

Lauren Banaszak, Loren Denlinger (Mentor), Medicine

Extracellular adenosine triphosphate (ATP) plays an important role in the inflammatory response and is a mediator in the pathogenesis of asthma. Eosinophils, pro-inflammatory leukocytes, contain ectonucleotidases that function to degrade ATP. We have observed low ATP concentrations in bronchoalveolar lavage (BAL) samples with high eosinophil counts, providing further evidence for the presence of these nucleotidases. My goal is to determine whether eosinophils possess secreted nucleotidase activity in addition to their external enzymatic activity. ATP degradation studies were performed on peripheral blood eosinophil samples stimulated with IL-5 to cause degranulation. Time course experiments were also conducted on BAL samples with varying eosinophil concentrations. Completion of this study will provide more information regarding eosinophil biology, ultimately leading to more research pertaining to asthma treatment and pathogenesis.

ANAEROBIC DIGESTION

Bryan Banh, Kendra Dahl, Kelly Derauf, Rebecca Larson (Mentor), Biological Systems Engineering

Anaerobic digestion (AD) is the promotion of the degradation of waste in an oxygen-free environment to produce biogas. Farms worldwide use AD systems to degrade manure into methane gas, the main component in biogas. Unfortunately, many managers are not trained on digester operations. This study will investigate a number of factors to develop a guide for improved operation using only common process controls. A 30-gallon pilot scale digester will be designed and constructed with continuous monitoring of conditions. The system will be operated to simulate common AD problems and produce outputs to identify the common issues. Results will be used to train operators and develop operational plans. Ultimately, the guide will increase biogas production, increase on-farm revenues, reduce digester closures, and increase sustainable energy production.

CHARACTERIZING PHYTOPLANKTON AND PARASITIC FUNGAL COMMUNITIES OF THE COLUMBIA RIVER COASTAL MARGIN

Kristina Bartowitz, Michelle Maier (Mentor), Oregon Health and Sciences University

Phytoplankton are the base of the food web in water ecosystems; they support higher trophic levels like micro and macro zooplankton and fish. There are four main drivers of phytoplankton dynamics: light, nutrients, grazers, and chytrid fungal infections. A major factor in algal success is the rates of infection by chytrid fungi. Chytrid infections of phytoplankton have begun to be explored in lake ecosystems but not in river or estuary ecosystems. Rivers are a much more dynamic environment than lakes, and the Columbia River system is especially interesting because of many dams controlling the flow, turning it into something like a slow moving lake. In order to determine the impact of chytrid fungi on phytoplankton in the Columbia River coastal margin, the four factors influencing phytoplankton dynamics were measured. Light measurements and nutrient samples were taken in the field and during lab experiments, and grazing rates and infection rates were measured in lab experiments.

SEQUENCING THE HCF1 LOCUS IN C57BR/CDJ MICE FOR GENES CONFERRING SUSCEPTIBILITY TO LIVER CANCER

Krista Batenhorst, Andrea Bilger (Mentor), Oncology

Liver cancer is a globally prevalent disease with a large disparity between male and female diagnoses. In inbred mouse strains, ovarian hormones have protective qualities against hepatocellular carcinoma, with the exception of female C57BR/cdJ (BR) mice. A locus on chromosome 17, Hcf1, was identified as a cause of BR susceptibility. We are sequencing the Hcf1 locus to find specific mutated genes in this area responsible for susceptibility of BR females. In thirteen sequenced genes in the Hcf1 locus, two mutations to introns within splicing regions were identified as unique to BR and possible contributors to high liver tumorigenesis in female BR mice. Because the Hcf1 locus is comparable to the chromosome 6p locus in humans, this information may be key to understanding human hepatocellular carcinoma.

CULTURAL PROPERTY AND ARCHAEOLOGY LAW

Kristina Bauer, Kimberly Alderman (Mentor), Law School

This project has worked to compile a database of a variety of issues concerning cultural property and law. Cultural property and law includes topics such as the repatriation of artifacts, thefts of cultural related items, and very generally laws associated with cultural property and archaeology. With the use of the internet and a Google Reader feed, the project looks for credible articles that are pertinent to these topics, then summarizes each article, and publishes each of them on the Cultural Property and Archaeology Law, an online legal resource about current issues in cultural property law. The research project works to create and uphold a stable database of articles concerning cultural property and law dating from 2008 to the present day.

INTRODUCTION TO UW-MADISON ACTIVITIES

Jed Becker, Ruth Olson (Mentor), Interdisciplinary Research Programs - Humanities

A folkloric sampling of athletic activities students at UW-Madison are involved in. The traditions, identities, and context of Hoofers, the UW Marching Band, and UW Recreational Sports are explored among other great traditions that involve physical activity!

NANOTECHNOLOGY IN THE MARKET: HOW THE NANOTECHNOLOGY INDUSTRY VIEWS RISK AND REGULATION

Sean Becker, Joseph Conti (Mentor), Sociology

Although there is limited toxicological knowledge of nanomaterials currently, the field of nanotechnology continues to be heavily commercialized. Despite such uncertainty, major stakeholders such as regulatory agencies and the nanotechnology industry are already negotiating what the emerging regulatory framework for nanotechnology will look like. This study fills the research gap in understanding how the nanotechnology industry perceives the risks of nanotechnology and how it views its regulation. Semi-structured, open-ended interviews were conducted with seventeen individuals involved in the commercialization of nanotechnology in the United States. Results indicate that the industry fears excessive and misinformed regulation and that they do not believe nanotechnology to currently represent significant dangers. Yet, the opinions of subject varied greatly from one another on most issues of risk and regulation.

INTERGENERATIONAL INFLUENCES ON SCHOOL-RELATED PARENTING

Courtney Belawich, Elizabeth Halama, Rebekah Lemahieu, Kyle Miller, Thomas Murphy, Kristin Orlowski, Janean Dilworth-Bart (Mentor), Human Development & Family Studies

This qualitative study examined how intergenerational influences affect school-related parenting behaviors that mothers want to continue or discontinue with their children. Forty mothers with preschool aged children participated in semi-structured interviews concerning children's school preparation. A thematic analysis of interviews identified salient themes related to mothers' memories of family involvement. Mothers desiring to continue family involvement provide rhetorical support, foster positive home environments and select high-quality schools. Mothers desiring to discontinue family non-involvement aim to increase school involvement, invest time in getting to know their child, and avoid unnecessary transitions. Findings support that mothers who recalled greater family involvement reported more strategies and active plans to prepare children for school. Themes will be presented and implications for early childhood educators will be discussed.

OPPORTUNITIES AND CHALLENGES OF A FAMILY OWNED MANUFACTURING BUSINESS IN A RURAL COMMUNITY

Andrea Belmonte, Debra Holschuh-Houden (Mentor), Business Outreach

Creating income and economic value within a community is often difficult in rural environments. Most successful rural manufacturing companies have been started and operated by families. Who benefits from a family business in a small town, the town or the family? This project will help us to better understand the opportunities and challenges of family owned manufacturing companies in rural communities. By interviewing a family business and other business leaders within a small town, I hope to understand how they contribute to the economies of a rural community. While a small town does not necessarily attract family businesses, a family business can become a great asset to communities to retain the population and to continue to enhance the quality of life within those communities.

HUMAN AND HEALTH TECHNOLOGY

Tate'yanna Bennett, Onur Asan (Mentor), Industrial Engineering

Professor Enid Montague and the researchers of the Human Computer Interaction Laboratory are determined to see how health technology influences a healthy doctor-patient relationship. Clinical visits were video taped and analyzed by coding the different eye movements for both doctor and patient. I record how often the doctor looks at the computer, the patient or various objects. Patients are also given the same treatment. The software with that skill is the Noldus Observer XT, which is designed for video coding, evaluation and analysis. I also scan the post-visit surveys that the patients take. The purpose of this research is to design trustworthy health technology, which will create a more personal relation between the doctor and the patient and help people to engage in healthy lifestyles.

THE HOMELAND PROJECT - UNDERSTANDING THE DYNAMICS OF NATIONALISM

Malak Benslimane, Nadav Shelef (Mentor), Political Science

The dynamics of nationalism play an important role in understanding border conflicts. An analysis of articles and speeches, generated by the Foreign Broadcast Information Service, and of maps present in print sources from various political parties was conducted to trace the persistence of border claims. French claims to Algeria and Egyptian claims to the Sinai Peninsula post-1967 were studied. This allowed for a spatiotemporal mapping of the border claims, showing how France eventually retracted its claims that Algeria was French, and how Egypt maintained that Sinai was an integral part of the motherland until Israeli withdrawal was achieved. The Homeland Project provides a way to study change in the idea of the homeland through time.

POINTS OF CONTACT: INVESTIGATING IDENTITIES OF TRANSNATIONAL ADOPTEES

Janelle Bentley, Katherine Corby (Mentor), Dance

This project is an exploration of adoptive identity as it pertains to adult transnational adoptees. Transnational adoptees are defined as persons who have been adopted into a nuclear family whose race or ethnic identity differs from their own. The research touches upon the historical development of international adoption in America, the effects of international standardization of adoptive practices, and will culminate in a multimedia performance that will synthesize personal anecdotes from individual transnational adoptees. The performance contains a series of vignettes that will elucidate the liminal experience of defining cultural and ethnic identity for adoptees. The project aims to illuminate the possibilities of combining interdisciplinary research with multimedia performance while also contextualizing international adoption within larger historical, social, and cultural structures.

WATEER: WISCONSIN ACADEMIC TEAMS ENGAGING IN ENVIRONMENTAL RESEARCH

Peter Bergquist, Kenneth Potter (Mentor), Civil & Environmental Engineering

Wisconsin Academic Teams Engaging in Environmental Research is the collaboration of school teacher, Nancy Werlein, first through fifth grade students at Madison's Leopold Elementary School, and the University of Wisconsin-Madison to develop new learning tools to inspire the young students' interest in the environmental sciences. WATEER will build enduring teaching materials for students at Leopold Elementary based on classroom activities focused on storm water runoff and water quality management. The project design will lay framework for a long-term plan for storm water management at the Leopold Elementary School and surrounding communities in Madison and Fitchburg that will provide teachers with a curriculum that incorporates the use of a rain garden, planned for construction on the school grounds.

REAL-TIME BREATH ANALYSIS SHOWS RAPID LIPID UTILIZATION FOLLOWING T1AM INJECTION IN MICE

Michael Bergquist, Fariba Assadi-Porter (Mentor), Biochemistry

Real-time breath analysis using CRDS, Cavity Ring-Down Spectroscopy, is a powerful tool for tracking the switch from carbohydrate metabolism to lipid utilization. 3-iodothyronamine, T1AM, is an endogenous derivative of the thyroid hormone speculated to cause weight loss via increased lipolysis. By analyzing natural abundance $^{13}\text{CO}_2/^{12}\text{CO}_2$ isotope ratios (^{13}C δ) in breath samples of mice pre- and post-injection with T1AM or saline solution, CRDS was used to detect real-time changes in ^{13}C δ values and to follow duration of a potential switch in metabolism. Breath analysis is a non-invasive and a fast method to detect switches from carbohydrate metabolism to other forms of metabolic states, a key tool in pinpointing the action times at which T1AM, a potential weight loss drug, has its greatest effects.

IMPACT OF FREEZE-THAW CONDITIONS ON GEOSYNTHETIC CLAY LINERS

Erin Berns, Sabrina Bradshaw (Mentor), Civil & Environmental Engineering

Geosynthetic clay liners (GCLs) consist of sodium-bentonite sandwiched between two textiles and are ideal hydraulic barriers due to characteristically low hydraulic conductivity. However, sodium-bentonite can undergo cation exchange when calcium replaces sodium, potentially altering hydraulic conductivity. GCLs are commonly placed as covers in waste containment facilities to prevent rainwater permeation and leachate formation. GCLs in covers are susceptible to freeze-thaw conditions potentially affecting cation exchange with cover soil pore water, causing increased hydraulic conductivity. This study exposed GCLs to freeze-thaw cycles, and permeated with cover water to simulate field conditions. The exchanged cations and hydraulic conductivity of the GCLs were determined and showed that sodium was replaced by calcium and the hydraulic conductivity remained low, suggesting that GCLs remain effective in covers under freeze-thaw conditions.

FAMILY OWNERSHIP OF PROFESSIONAL SPORT FRANCHISES

Samuel Bernstein, Debra Holschuh-Houden (Mentor), Business Outreach

I am investigating the rules of family ownership in professional sports, and why the NFL has rules pertaining to family ownership, and how this has made it efficiently run compared to the other big three Professional Sports Leagues, in the NBA, MLB, and NHL. I will interview the affiliates of the Leagues of each sport, and teams from each league that have family ownerships and non-family ownerships. I will conduct research into why the NFL has established rules about family ownership, and use the information I have learned about family businesses to show why, through Family ownerships, the NFL has become the powerful, dynamic entity it is today. My results will show that through the NFL requiring family ownership of teams, that this has contributed to why the NFL is the most powerful sports league in the United States today, compared to the other Leagues. This project will show to other professional sports leagues as to why they should require family ownership of it's teams. It will show the other leagues the opportunities, benefits, and profits they can achieve through family ownership.

EVALUATING THE ROLE OF RISK IN WISCONSIN BIOMASS INFRASTRUCTURE DEVELOPMENT

Ashwini Bharatkumar, Carol Barford (Mentor), Center for Sustainability and the Global Environment (SAGE)

Concern for the environmental and geopolitical impacts of dependence on fossil fuels has focused more attention and efforts on bioenergy development. Farms can produce bioenergy feedstocks, but to do so, farmers must assume new opportunity costs and risks. This study assesses the inherent uncertainty and risk assumed by Wisconsin farmers when utilizing switchgrass or corn stover for bioenergy production. Using Monte Carlo simulation, the project models the primary environmental and economic risks faced in bioenergy feedstock production and quantifies the

impacts of these risks on farmer income. Based on the financial risks posed to feedstock growers, potential risk mitigation strategies are identified.

CENTER FOR WOMANS HEALTH RESEARCH, R01 GRANT STUDY

Ismat Bhuiyan, Mary Carnes (Mentor), Medicine

There are links between advances in women's health research and women's progress to leadership in biomedicine. Despite women's progress in biomedical careers, there are still many barriers to their advancement. These barriers are problematic because they stall the production of woman's health information. The National Institutes of Health (NIH) funds the majority of biomedical research programs across the U.S. Currently, women have lower success rates for research program (R01) grants than men. We are examining the peer-review process at NIH for biases about gender that may be disadvantaging women in obtaining R01 grants. We are specifically studying investigator's grant reviews from 2008 R01 applications.

INVESTIGATING THE ROLE OF MEDICAGO TRUNCATULA ROPGEFS IN ROOT NODULE SYMBIOSIS

Dana Billing, Muthusubramanian Venkateshwaran (Mentor), Agronomy

Legumes establish symbiotic association with rhizobial bacteria to meet their nitrogen requirement. However, the molecular mechanism mediating this symbiotic interaction is not completely known. Rho-related GTPases of plants (ROPs) and their regulators, such as guanine nucleotide exchange factors (RopGEFs), have been shown to mediate several developmental processes in plants and their responses to external biotic stimuli. Hence, we aim to investigate the role of RopGEFs in legume-rhizobia symbiotic signaling. Utilizing RNAi-based gene silencing, we characterize the role of MtRopGEFs in the initiation of the rhizobia-legume symbiosis.

MOLECULAR PROFILES AND THERAPEUTIC RESPONSE OF MOUSE MODELS OF HEAD AND NECK CANCER

Grace Blitzer, Randall Kimple (Mentor), Human Oncology

To improve the understanding of the better prognosis found in Human papillomavirus (HPV) associated head and neck cancers, we examined transcriptional profiles of viral oncogenes and their relationship to other relevant biomarkers. RNA from frozen tumorgraft tissue was reverse transcribed into cDNA and used to assess relative expression of HPV-16 oncogenes E5, E6, and E7 in addition to GAPDH and p53. Immunohistochemistry was used to assess protein levels of p53, Rb, p16, and EGFR. A high correlation was found between oncogene expression by qRT-PCR and down regulation of target proteins p53 ($p=0.05$) and Rb ($p=0.12$) by immunohistochemistry. HPV-positive tumorgrafts show profiles consistent with their known oncogenic mechanisms. Understanding molecular alterations for HPV-positive cancers may enable the use of more personalized therapy and improved outcomes.

BRAIN BLOOD FLOW IN PATIENTS WITH METABOLIC SYNDROME: ASSESSMENT OF IMPAIRMENT AND CHANGES WITH PART

Anne Bolgert, William Schrage (Mentor), Kinesiology

We hypothesize adults with metabolic syndrome (MetSyn) will have impaired brain blood flow (BBF) responses to environmental stressors and these responses will improve with participation in an 11 month diet and exercise program. To determine whether the MetSyn group has impaired BBF, their responses will be compared to age-matched lean subjects' responses. To determine whether the MetSyn group can improve BBF responses with diet and exercise, subjects are studied 2 weeks, 3 months, and 11 months into the program. BBF is measured using Transcranial Doppler ultrasound. Results are not yet available for this study, however, with confirmation of our hypotheses, health care providers may improve their treatment for MetSyn patients to minimize their risk for cerebrovascular disease.

GENE EXPRESSION OF DOWN SYNDROME INDUCED PLURIPOTENT STEM CELLS

George Bonadurer, A Bhattacharyya (Mentor), Waisman Center

Down syndrome (DS) is a chromosomal condition caused by an extra 21st chromosome and is the leading genetic cause of mental retardation. Research of DS mouse models has demonstrated a connection between abnormal neurogenesis and overexpression of certain chromosome 21 genes. An innovative method to study DS in a human system involves using induced pluripotent stem (iPS) cells generated from DS skin cells. Quantification of gene expression by microarray demonstrates global misexpression, characterized by an approximately 50% increase in chromosome 21 gene expression. Furthermore, while gene misexpression on each other chromosome is evenly balanced, 35% of genes on chromosome 21 are overexpressed, compared to only 4% underexpressed. Further analysis into chromosomal loci and pathways acutely affected may elucidate the implications of expression defects in DS.

BRONZE CASTING AT ANCIENT TROY: NEW LIGHT ON THE WEST SANCTUARY IN HELLENISTIC TIMES

Jacquelyn Bonavia, William Aylward (Mentor), Classics

The West Sanctuary at the ancient city of Troy was once believed to be solely a religious center, but the recent discovery of bronze casting pits in the sanctuary suggests a secondary function as an industrial center for the production of bronze, probably intended for decoration of the sanctuary's religious buildings. In order to gain a better understanding of these new discoveries, and especially the types of artifacts created in the bronze casting pits, I have participated in the firsthand study of the West Sanctuary during the expedition to Troy (in northwestern Turkey) in 2011. My interdisciplinary project, which involves archaeology, art history, metallurgy, and religion, aims for a better understanding of the West Sanctuary's place in Troy and in the ancient Mediterranean world.

QUANTIFYING OPTIC NERVE AXON LOSS IN A CAT GLAUCOMA MODEL BY A SEMI-AUTOMATED METHOD

Owen Bowie, Gillian McLellan (Mentor), Ophthalmology & Visual Sciences

Glaucoma is an important cause of blindness in humans due to optic nerve damage. Inherited feline congenital glaucoma is one of few spontaneous "large eyed" animal models for study of the disease. The purpose of this project is to validate a semi-automated targeted sampling (SATS) method for quantifying axons in cat optic nerves (ON). Cross-sections were prepared from ON of 6 normal and 9 glaucomatous cats. Axons were counted using full-count and SATS methods. To evaluate inter-observer reproducibility of the SATS method, 3 masked observers collected axon counts from the same 15 samples. Correlation between SATS and full-count methods was strong (linear regression slope = 1.10, $r^2=0.96$). The SATS method provides a rapid, consistent way of quantifying axon loss in cats with glaucoma.

ORNITHINE DECARBOXYLASE ANTIZYME 1'S ROLE IN THYROID HORMONE MEDIATED CARDIAC HYPERTROPHY

Marielle Brenner, Eugene Kaji (Mentor), Medicine

There are two types of cardiac myocyte hypertrophy: pathological and physiological. The physiological hypertrophy has been linked with the upregulation of α MHC and a known stimulus for this upregulation is the interaction of T3 with thyroid hormone receptor α ($TR\alpha$). In a previous study in yeast, we found that ornithine decarboxylase antizyme 1 (OAZ1) may interact with $TR\alpha$, which brings into question what effect, if any, OAZ1 has on $TR\alpha$'s ability to upregulate α MHC expression and what significance this interaction may hold in a mammalian heart cell. This was tested through transfection and luciferase assays, quantitative real time PCR, western blot, GST-pull down, and mammalian two hybrid assay.

BIOCORE OUTREACH AMBASSADORS: ASSESSING PARTNERSHIPS WITH RURAL K-12 SCIENCE EDUCATORS

Rebecca Breuer, Daniel Parrell, Michelle Harris (Mentor), Biocore

The Biocore Outreach Ambassadors (BOA) are UW-Madison undergraduates who have been working side-by-side with K-12 classroom teachers and community members since 2004 to enrich inquiry-based science education in rural Wisconsin communities. With funding from a Wisconsin Idea Fellowship, we are conducting research to assess the impact of BOA outreach on K-12 teaching approaches. We will collect data from our collaborating teachers using online surveys and recorded interviews. We will present our research findings about the knowledge, beliefs, and confidence of K-12 science educators. Data collected from K-12 teachers in our partner school districts will allow us to assess our impact on teachers, design better activities that cater to our collaborators' needs, and reaffirm our use of inquiry-based science teaching.

A LOW-PHENYLALANINE DIET IMPROVES BRAIN MASS AND NEUROTRANSMITTERS IN PHENYLKETONURIA MICE

Therese Breunig, Denise Ney (Mentor), Nutritional Sciences

Phenylketonuria (PKU) is a genetic disorder caused by a deficiency of the phenylalanine hydroxylase enzyme which metabolizes phenylalanine (phe) to tyrosine. PKU individuals must maintain a low-phe diet to reduce phe concentrations and avoid brain damage and neuropsychological impairments. Since a low-phe glycomacropeptide (GMP) diet lowers phe concentrations in blood and brain, our objective was to assess if dietary GMP improves brain mass and brain concentrations of neurotransmitters (NT). We fed PKU and wild type mice defined low-phe GMP or AA diets or a high-phe casein diet from weaning through adulthood. Brain mass and NT concentrations were impaired in PKU vs. wild type mice with improvements in mice fed the low-phe AA and GMP diets. The GMP diet increased brain mass in female PKU mice.

LEACHING OF TRACE ELEMENTS FROM ROADWAYS CONSTRUCTED WITH RECYCLED INDUSTRIAL BY-PRODUCTS

Brigitte Brown, Sabrina Bradshaw (Mentor), Civil & Environmental Engineering

The use of recycled concrete aggregate (RCA) as a road base has lowered costs of road construction while preserving virgin aggregate resources. Laboratory column leach tests have shown that leachate produced by RCA is persistently highly alkaline, potentially threatening groundwater quality. However, field-monitoring studies of RCA road base have not produced similar alkaline leachates. Both field and laboratory methods were employed to further study, compare, and predict leaching characteristics of RCA as a road base. This study produced first flush field data to determine the initial leaching characteristics of RCA. Congruent laboratory tests were also run to compare with field data. This study will provide the data necessary to predict environmental impacts associated with the uses of RCA as a road base in road construction.

DEVELOPING A NOVEL TOOL FOR INVESTIGATING THE FUNGAL GENOME

Thomas Bryan, Jean-Michel Ane (Mentor), Agronomy

Genetic engineering is a fundamental technique to modern biological research. It allows study of a biological system in which genes of interest can be artificially over-expressed or under-expressed. This enables the scientific community to test their hypotheses about whether or not these genes of interest are functionally important in the biological system. Most fungal genomes are not yet amenable to modern genetic engineering techniques. This has stymied genetic characterization of many fungi that have impacted human health and food sources. I aim to develop a new tool to engineer any gene of interest in a soil-borne fungus. I will build upon established genetic engineering techniques for plants and optimize them for use in a fungal system.

CHEMICAL SYNTHESIS OF ATYPICAL AND TETRAUBIQUITIN CHAINS TO ELUCIDATE THE UBIQUITIN CODE

Lauren Buckley, Eric Strieter (Mentor), Chemistry

Many intracellular signaling mechanisms rely on protein modification by polymers of the highly conserved 76 amino acid protein ubiquitin. Polyubiquitin chains attached through different lysine residues present in ubiquitin have the potential to generate a myriad of distinct biological responses. Though current methods allow enzymatic formation of some ubiquitin homopolymers, as well as chemical synthesis of ubiquitin dimers, longer chains of several lysine linkages and all branched ubiquitin heteropolymers have yet to be isolated. This research proposes a novel method to achieve facile access to ubiquitin chains of any length with any regiospecificity at each junction using lysine mimic linkages formed by chemoselective thiol-ene chemistry. This chemical tool will be used to help decipher the role of nucleosomal ubiquitination in the DNA damage response.

THE ROLE OF PGC-1A IN REGULATING FAT CELL METABOLISM

Albert Budhipramono, Rozalyn Anderson (Mentor), Medicine

Long-term caloric restriction (CR) induces a multitude of changes in diverse species, improving health and longevity. In mice, CR causes metabolic reprogramming of adipocytes in white adipose tissue. PGC-1 α , a transcriptional coactivator and a key regulator of energy metabolism, is thought to play a role in this process. Nevertheless, the mechanism is not well known. To determine the role of PGC-1 α in adipocytes, we have constructed lentiviruses containing either an additional copy of the PGC-1 α gene or PGC-1 α specific knock-down. We will determine the impact of altered PGC-1 α on adipocyte metabolism and systemic signaling. This study is highly relevant to human health as it can provide insight into diseases of metabolic dysfunction, which include many age-associated diseases.

SAVOR SOUTH MADISON: HOW EMERGING TECHNOLOGY PROMOTES A SENSE OF COMMUNITY

Anna Bukowski, Maarja Anderson, Erin Luhmann, Young Kim (Mentor), Journalism and Mass Communication

Our Service Learning class, "Technology for Social Change" develops an integrated internet-based social media platform that aims to bond an ethnically, racially diverse neighborhood, South Madison, and bridge this neighborhood more clearly to the rest of Madison (especially UW-Madison campus community) through food. We collaborated with the South Madison Metropolitan Planning Council, community and campus leaders, as well as ethnic restaurant/grocery stores in South Madison. The platform is designed to provide a "hub" where individuals and various groups can engage in community through food-related venues, events, and story-sharing. The platform is designed to integrate various levels of mediated communication, different forms of engagement, and on-line and off-line interactions.

CHANGES YOU CAN MAKE TO YOUR NEIGHBORHOOD

Grace Burkard, Laura Senier (Mentor), Community & Environmental Sociology

This research will identify strategies communities can use to come together and solve problems. The mayor dispatched two nurses to Southwest Madison, to address concerns about neighborhood safety and teen violence. They started multiple programs to help clean up neighborhoods and promote positive role models for younger generations. The goal is to influence youth and educate adults in aspects that will bring positive outcomes. The core is built around community dinners where the neighbors discuss a general topic and come up with ideas to fix it. The nurses will continue to work on this for another year before turning it over to the community itself. Our research will identify strategies that contribute to the sustainability of these initiatives, and that other communities can learn from.

RELATIONSHIPS BETWEEN FATIGUE AND CHRONIC HEART FAILURE

Nicole Cancel, Beth Fahlberg (Mentor), Nursing

Heart failure (HF) is a chronic life-limiting illness which affects about five million Americans each year. This disease occurs when the heart pumps oxygenated blood insufficiently throughout the body. Medications help patients' debilitating physiological condition, but they can't reverse heart failure or prevent its symptoms. Fatigue is one of the most common symptoms reported by heart failure patients, and there are currently no treatments for fatigue in HF. The purpose of this research was to determine the relationship between fatigue and quality of life in HF patients, depending on functional status, preexisting conditions, and depression. We assessed the prevalence of fatigue within 52 heart failure patients, and how it correlates with these independent variables. The correlation between the three, separate relationships proved significant, and while fatigue alone accounted for about 9.9% of a patient's quality of life. The results of our study revealed the areas where future research should focus on for developing a treatment for fatigue in HF patients.

EFFECTS OF NITROGEN CONCENTRATION AND LARVAL DENSITY ON GYPSY MOTH (LYMANTRIA DISPAR) CANNIBALISM

Zachary Cannizzo, Kenneth Raffa (Mentor), Entomology

Nitrogen is the major limiting nutrient to growth by plant feeding insects. Concentrations of nitrogen in plants are far lower than in insect tissue, and furthermore, plants contain defensive compounds that reduce the digestion and uptake of nitrogen. Yet, some herbivorous insects such as gypsy moth undergo outbreaks that transform entire forests despite this physiological constraint. Cannibalism occurs in many insects and may be influenced by population density as well as the nitrogen level of the food substrate. We tested the effects of cannibalism on gypsy moth larvae through varying larval densities and a range of nitrogen concentrations. We also evaluated gypsy moth behavior following cannibalism events. We found that both density and nitrogen are major contributors to cannibalism in gypsy moth.

TEMPLETON HOSTILE MEDIA EFFECT IN TEACH THE CONTROVERSY

Elizabeth Cao, Gabriel Orduna, Albert Gunther (Mentor), Journalism and Mass Communications

This research project explores why people on different sides of a controversial issue - in this case believers in creationism vs. intelligent design vs. evolution - are prone to see neutral media content on that issue as biased against their views. This project focuses on audience perceptions of (and reactions to) media content relating to the creation versus evolution controversy. To study the hostile media phenomenon as it relates to this science-religion debate, we will use an experiment to examine the conditions under which members of organized groups supporting either creationism or evolution judge media messages either as agreeable or hostile to their own position. The goals of this project include identifying the important audience factors, such as pre-existing attitude on the issue and group identification, that contribute to the hostile media phenomenon, as well as understanding the psychological mechanism that underlies the phenomenon.

SOUTHEAST ASIA AND SOUTH CHINA'S IMPACT ON THE SILK ROAD AND EUROPE

Eric Carlucci, Nam Kim (Mentor), Anthropology

The Silk Road has been a major economic and cultural force for hundreds of years. Much is known of its later influence on Western culture, and South China and Southeast Asia played a part in that influence. Through examples of maps and historical documents, my research attempts to show a connection between two regions of the world separated by great distances and culture. Recent years of archaeological research in both Europe and Southeast Asia show a fair degree of down-the-line trade. This project is important because it will help more people understand the role Southeast Asia has played through history both in the context of Asia and Eurasia.

UNDERSTANDING THE SYNTHESIS OF SINGLE-WALLED CARBON NANOTUBES BY CHEMICAL VAPOR DEPOSITION

Tou A Chang, Michael Arnold (Mentor), Materials Science & Engineering

The study is to synthesize single-walled carbon nanotubes (SWNTs) with controllable diameter of less than one nanometer. SWNTs are one-dimensional structures consisting of sp²-bonded network of carbon atoms. They have attracted attention due to their unique mechanical, electrical, and thermal properties; however, their applications have been limited by the inability to grow SWNTs with uniform diameter. In this work, bimetallic Co-Mo catalysts were deposited onto silicon substrates using dip-coating. The SWNTs were synthesized via CVD using ethanol as the carbon precursor. The effects of catalyst particle thinning via reduction and growth parameter such as temperature, precursor flux, and pressure were studied to understand their effect on the resulting SWNT diameter. This understanding will aid future studies in producing SWNTs with tailored properties for specialized applications.

THE BADGER REPORT

Kathryn Chappell, Kyle Deckelbaum, Parker Gabriel, Patricia Hastings (Mentor), Journalism and Mass Communication

During the fall semester of 2011, our Journalism class became a working news team. Each week we created a full, comprehensive newscast, in which 2-3 student anchors delivered stories of the week. Student pairs worked as a cameraman/reporter crew to find real life stories throughout Madison, conduct interviews, and edit a video package for the program each Thursday during class. The Badger Report successfully uploaded a working website with all of our news clips from the semester. We would like to showcase several of our outstanding packages at the Symposium. Our class of 14 students became news editors, assignment directors, reporters, anchors, sports reporters, weathermen and photo editors each week in order to put together a compelling and informative newscast for the student body and Madison area as a whole.

THE DEGREE OF GENETIC INFLUENCE ON AUTISM

Maria Chavez, Harold Goldsmith (Mentor), Psychology

The Twin Autism Project enrolls twin pairs born in Wisconsin in which at least one of the twins shows Autism Spectrum Disorder. The project seeks to estimate the degree of genetic influence for autism. Results from 54 twin pairs show probandwise concordance rates of 69% for monozygotic and 23% for dizygotic pairs, which confirms substantial heritability of autism. Many of the assessments done in the autism twin study are also done in a twin study of 600 pairs with a variety of other diagnoses. Considering the two studies jointly helps determine whether risk factors are specific to autism or more general. Findings could help further our understanding of the nature of autism, including its heterogeneity and its links to other pediatric conditions.

COMPARATIVE STUDY FOR THE VIRUS PRODUCTION OF VESICULAR STOMATITIS VIRUS ON TUMOR CELLS

Bingming Chen, Adam Swick (Mentor), Chemical and Biological Engineering

Vesicular stomatitis virus (VSV) is a well-studied negative stranded RNA virus and potentially a good oncolytic virus. The purpose of this study is to determine how the virus production of attenuated mutants of recombinant VSV change on tumor cells with different immune responses, searching for the best candidate for a potential oncolytic therapy. Five recombinant strains of VSV were used to infect three prostate cancer cells with different levels of antiviral response: wild type human prostate cancer cells (PC-3) and two recombinant PC-3 lines that had engineered deficiencies in innate immunity. Viral production in these cell types was compared at different multiplicities of infection at different time intervals post-infection. The VSV production increased with increased defectiveness of the interferon signaling pathway of the host cells.

DETECTION OF FILAMENTOUS SALMONELLA ON LOW-AW FOOD ITEMS AND ENUMERATION METHOD OF FILAMENTOUS SALMONELLA

Bingming Chen, Amy Wong (Mentor), Bacteriology

Under certain stresses, Salmonella can form multi-chromosomal filaments, which can septate under favorable conditions. Filaments also form a single colony on a plate, which would lead to underestimating the number of viable cells. Filamentous Salmonella were detected on the surface of dried food items. Therefore, it is important to develop an enumeration method that accounts for each filament septating into multiple viable units. By incubating filamentous Salmonella cells in 0.2x Luria-Bertani broth at room temperature for 8 hours, the percentage of filamentous cells decreased from 70% to 18% of the total number of cells. Concurrently, the concentration of cells increased, indicating septation and division. Therefore, it is important to develop a method for enumerating the number of viable cells of the filamentous Salmonella.

RETIREMENT, CHILDREN, AND LATER-LIFE MENTAL HEALTH AMONG OLDER AMERICANS

Cheng Cheng, James Raymo (Mentor), Sociology

Past research has typically investigated the health effects of retirement and children separately. Few studies have examined how retirement and children may each uniquely and interactively affect the psychological well-being of older Americans. Using the Health and Retirement Study, this paper examines how the relationship between retirement and later-life mental health may depend on the presence of, and perceived future support from, children. Results suggest that full retirement, childlessness, and lack of perceived future support from children are associated with more depressive symptoms in later life. The presence of, and perceived support from, children does not appear to moderate the effect of retirement. In light of projected delays in retirement and increasing childlessness, this study suggests that the potential negative consequences of complete retirement may be postponed as people retire later and underscores the importance of promoting supportive relationships between elderly parents and their children for better later-life mental well-being.

NM404 TARGETS MALIGNANT BRAIN CANCER STEM CELLS BY DISRUPTING THE AKT MOLECULAR PATHWAY

Hong-En Chen, Paul Clark (Mentor), John Kuo (Mentor), Neurological Surgery

Cancer stem cells (CSC) are hypothesized to initiate and drive malignant tumor growth and recurrence. Due to their self-renewal and tumor initiating abilities, CSCs, a small subpopulation of cancer cells, have become a main target of cancer therapies. Our research targets the cancer stem cells of glioblastoma multiforme (GBM), the most malignant and common primary brain cancer in humans. NM404, an alkyl-phospholipid synthesized to target cancer stem cells, is retained in 52/54 tumors and displays great therapeutic potential in cancer treatment. Additionally, NM404 dose-dependently decreases proliferation and survival of GBM CSCs.

Through immunoblotting, we demonstrated involvement of the Akt pathway disruption as a mechanism of NM404's efficacy on cancer stem cells.

INVESTING IN PUBLICLY TRADED FAMILY BUSINESSES

Ziyang Chen, Debra Holschuh-Houden (Mentor), Business Outreach

Family businesses may seem like a small part of the American economy. However, about 90% of the businesses in the United States are family businesses. According to Fortune magazine, about 60% of publicly traded firms are family businesses. Since family businesses represent a sizeable portion of the United States economy, it would be wise for investors to consider investing in them. One study shows that publicly traded family businesses outperformed management-controlled businesses by 6.65% in the 1990s. My research will back test various family business investments, such as passive investing and growth investing. I will examine the results in all historical periods and look at the differences in performance during recessions and booms. I will then identify the factors that led to the differences.

THE EFFECT OF WIND GENERATED RADIO NOISE ON NEUTRINO DETECTION AT ICECUBE

Edward Cheng, Jan Auffenberg (Mentor), UW-IceCube Research Center

Plans are underway for a next generation array to detect neutrinos at energies greater than 100 PeV to probe the high energy Greisen-Zatsepin-Kuzmin (GZK) neutrinos. The proposed method utilizes the Askaryan Effect. IceCube has several Radio Frequency detectors, AURA (Askaryan Under-ice Radio Array), and the currently under construction Askaryan Radio Array (ARA). Though AURA is located in a radio quiet environment, wind generated background radio noise is an important issue. Using waveform profiles taken from AURA and wind data provided by the Clean Air (CAIR) automated weather station of the Antarctic Meteorological Research Center (AMRC), we calculate the statistical correlation of wind speeds with respect to radio event trigger rates and frequencies.

THE ROLE OF AMPK IN FAT CELL METABOLISM

Monica Chou, Rozalyn Anderson (Mentor), Medicine

Caloric restriction without malnutrition slows the aging process, reducing the risks of age-associated diseases. Our lab studies adipose tissue and how it changes with caloric restriction. Not only does adipose tissue store energy, it also produces signaling molecules that impact the body in negative or positive ways. We propose that adenosine monophosphate-activated protein kinase (AMPK), a cell-signaling molecule, plays a role in adipose tissue remodeling with caloric restriction. Using 3T3-L1 adipocytes, we will investigate how AMPK impacts metabolism and fat storage during the process of differentiation. In addition, we will determine the impact of age and caloric restriction on AMPK in adipose tissue from mice. This study may reveal novel targets for treatment of age-associated diseases.

AMMONIA-OXIDIZING ARCHAEA IN DRINKING WATER

Clara Chow, Daniel Noguera (Mentor), Civil & Environmental Engineering

In some cities, drinking water distribution systems have gradually replaced chlorine disinfection with chloramine. Chloramine releases ammonia, which fuels the nitrification process in water, through the growth of heterotrophic organisms such as ammonia-oxidizing archaea (AOA). These recently discovered organisms may alter the view of nitrifying organisms and may ultimately lead to a new understanding of the global nitrogen cycle. In order to extend understanding of AOA, AOA was grown in a batch reactor and its response to chloramine disinfection was analyzed over time. The concentration of cells was quantified by qPCR, and dead cells were prevented from amplifying by using propidium monoazide.

EFFECTIVENESS OF BENTONITE AS AN ANNULAR SEAL IN MONITORING WELLS

Cole Christiansen, Sabrina Bradshaw (Mentor), Civil & Environmental Engineering

The objective of this study is to determine if the Wisconsin Groundwater Monitoring Well Requirements for sealing the annular space in wells describe an adequate method for preventing unwanted vertical flow of contaminants. The current method employs bentonite clay to prevent migration of fluid between contaminated and uncontaminated aquifers and from the ground surface to the screened portion of a well. Previous studies suggest that bentonite seals may fail under certain conditions. Physical models were constructed to simulate different hydrogeologic conditions. A dye system will be used to identify crack/voids in the seal, along with the evolution of contaminant penetration. The results will identify if current material and installation procedures are adequate, or if modifications need to be made to the annular seal system.

BICAUDAL-C: REGULATOR OF CELL-FATE DECISIONS IN EMBRYOS AND ADULT TISSUES

Andy Chung, Michael Sheets (Mentor), Biomolecular Chemistry

Polycystic Kidney Disease (PKD) is a leading cause of end-stage renal disease in humans, characterized by painful fluid-filled cysts that impair kidney function. Bicaudal-C is a translational regulatory protein required by kidney cells to develop and function properly. Importantly, mutations in Bic-C lead to the formation of cysts and PKD. However, its precise role in regulating kidney cell functions remains elusive. The Bic-C protein contains a SAM domain required for its function, but the role of Bic-C's SAM domain is enigmatic. To address this issue, we are analyzing the role of the SAM domain in mediating interactions between proteins. Understanding Bic-C will broaden our understanding of its role in embryonic development and provide us insight regarding PKD.

COMPARISON OF THE DISTRIBUTION OF GDNF USING TWO AAV SEROTYPES IN THE STRIATUM

Megan Claflin, Susan Osting (Mentor), Neurology

Glial cell line-derived neurotrophic factors (GDNF) has been proposed for gene therapy trials of Parkinson's disease (PD). The Adeno-Associated Virus serotype 5 (AAV5) is thought to be a more efficient vector serotype than serotype 2 (AAV2) due to its superior distribution throughout the striatum. Therefore, we investigated the distribution properties of AAV2 and AAV5 coding for GDNF. We have found that indeed at a given dose, the distribution of AAV5-GDNF is higher than AAV2-GDNF. Comparison of the different distribution efficiencies of AAV2 and AAV5 will help determine the most suitable serotype to use in future clinical trials.

CHARACTERIZATION OF MHC CLASS II DRB TRANSCRIPTS IN MACAQUES USING HIGH THROUGHPUT PYROSEQUENCING

Jacob Clark, David Oconnor (Mentor), Pathology and Laboratory Medicine

Nonhuman primates are essential to biomedical research and provide models for disease pathogenesis, transplantation, and bioterrorism research. Although nonhuman primates are used extensively in biomedical research, their highly polymorphic major histocompatibility complex class II DRB (MHC-DRB) genetics remain under-characterized for many populations. In this study we characterized the MHC-DRB genes of 272 rhesus, cynomolgus and pig-tailed macaques via a novel Roche/454 pyrosequencing genotyping procedure. From these macaques we were able to characterize 104 previously unreported alleles while extending the length of sequence for 50 others. The novel genotyping procedure described allows for the efficient and reliable genotyping of more animals in a shorter time than traditional cloning methods. Rapid, high resolution methods for MHC-DRB genotyping will enable researchers to more easily define genotype-phenotype associations, while an expanded database of known MHC-DRB alleles will allow them to effectively determine MHC-DRB haplotypes for their animals.

PEER PARTNER PROJECT

Leslie Cohen, Jared Burris, Colleen Moss (Mentor), Waisman Center

Meaningful inclusion of students with disabilities in general education classrooms is necessary for equal opportunities for social, emotional and academic growth. The Peer Partner Project (P3) is examining interventions in high schools to increase interactions between students with and without disabilities. Peer Supports pair 1-2 students with a student with disabilities during classroom activities. Peer Networks gather 3-6 students who spend time with the focal student outside the classroom. Pre and post data is collected through classroom observations, parent and teacher standardized measures and surveys. 2011 pilot data demonstrated that Peer Support and Peer Network interventions positively impacted students with and without disabilities and increased their interactions. By implementing peer-mediated interventions, teachers and students can increase social and academic opportunities for all students.

REDUCING INFANT MORTALITY RATES IN UGANDA: A POSTNATAL EDUCATION PROGRAM AT IGANGA DISTRICT HOSPITAL

Michele Coleman, James Ntambi (Mentor), Biochemistry

Every year 4 million newborns die within the first month of life and two thirds of these die within the first week. Uganda's infant mortality rate as of 2009 was 79.4 per 1000 births and at the Iganga District Hospital 120 per 1000. While working closely with Iganga Hospital and University faculty, I created a postnatal education-based program administered to mothers focusing on danger signs, breastfeeding, family planning, and cord care to lower the first week neonatal infant mortality. After implementation, 87 mothers and infants were reached through the program. 58 of the 87 mothers received the education. Upon follow up, only 1 infant in the control group died during the first week following birth. This illustrates the importance of proper postnatal care knowledge and application in lowering infant mortality.

EVALUATION OF THE NOVEL GRAPHENE ON ITO FLEXIBLE TRANSPARENT CONDUCTOR FOR PHOTOVOLTAICS APPLICATION

Wesley Collier, Michael Arnold (Mentor), Materials Science & Engineering

A new generation of flexible electronic displays and solar cells demand a new material that is transparent, highly conductive, and flexible. Results from a promising and novel graphene based contender in the race for such a material will be presented. Bending vs. conductivity data from graphene on indium tin oxide, ITO, on flexible substrate polyethyleneterephthalate, PET, will be compared with results from the control materials graphene on PET and ITO on PET. Bending data from a two point bend test will consist of sample curvature data from in situ. optical methods. Conductivity data will be presented from a two probe electrical measurement. Data will take the form of conductivity vs. bending curves.

PHONETIC PHENOMENA IN THE SPANISH OF HERITAGE SPEAKERS

Antonio Conchas, Rajiv Rao (Mentor), Spanish and Portuguese

Heritage speakers (HS) of Spanish are individuals raised speaking Spanish who are later introduced to the educational system, where they attain equal to higher levels of English competence. In this study, we examine background variables that make this group sound either more Spanish dominant or language learner-like. First, HS were recorded performing various reading and speaking tasks and specific sounds were analyzed using PRAAT speech analysis software. Then, their speech was compared to a control group of Spanish dominant speakers. Finally, language history questionnaires and surveys were used to determine which background variables correlate with native-like sound production. Preliminary results indicate that those who attended bilingual education as a child and maintain current Spanish speaking networks produce more native like sounds in their speech.

SPINAL CORD INJURY IN THE UNITED STATES AND CHINA, AN ANALYSIS OF WORKERS AND FARMERS

Alex Cook, Chou Thao, Tommy Yu (Mentor), Orthopedics/Rehabilitation

The purpose of this research is to raise awareness of how many Chinese farmers and workers have spinal cord injuries compared to the United States. In China, more than 60% of spinal cord injuries are from workers or farmers, and more than 90% will not seek further help for their injuries. This project involves extensive literature review of data pertaining to spinal cord injuries rates, as well as policy issues and quality of life focusing on Chinese workers and farmers. With this study we will heighten awareness of such injuries and their causes, with the goal of reducing and preventing spinal cord injuries through treatment and policy reforms.

"FAREWELL MY BOOK, AND MY DEVOTION": COURTLY LOVE AND SKEPTICISM IN CHAUCER AND ANDREAS CAPELLANUS

Madeline Crane, Kellie Robertson (Mentor), Medieval Studies

My thesis examines the treatment of philosophical skepticism in medieval literature by studying the influence of Andreas Capellanus' *De Amore* on the works of Geoffrey Chaucer. In doing so, this project explores the various portrayals of the medieval conventions of courtly love and challenges the misconception that the Middle Ages were a time of unquestioning faith in tradition. I examine three of Chaucer's texts, the *Knight's Tale*, *Troilus and Criseyde*, and the *Legend of Good Women* in the context of Andreas' work, using a combination of close reading and studying the work of renowned literary scholars. This project uncovers the ways in which medieval writers dealt with the same uncertainty that was growing in theology and philosophy in the less controversial realm of courtly poetry.

RELATIONS BETWEEN PARTNERS' HEALTH INDICATORS AND DYADIC COPING AMONG YOUNG ADULT DATING COUPLES

Amelia Cuarenta, Kristen Anderson, Emma Kosciolk, Eunjin Lee, Dana Nixon, Lauren Papp (Mentor), Human Development & Family Studies

Dyadic coping is defined as a stress management coping process where partners either ignore or react to each other's stress signals in order to maintain the well being of the relationship (Kayser & Scott, 2008). The purpose of this study is to investigate partner symptoms of depression, anxiety and physical health problems as correlates of dyadic coping among young adult dating couples. Participants included 59 heterosexual couples who completed questionnaires describing health problems, anxiety, depression, and dyadic coping. We hypothesize that better overall health of partners (physical and mental) will be linked to more positive dyadic coping strategies (e.g., communicating empathy) in the relationship and inversely related to negative dyadic coping (e.g., withdrawal from a partner when stressed).

EFFECT OF POST-TESTING LOCATION ON PARKINSONIAN RAT ULTRASONIC VOCALIZATIONS

Kaylee Cullen, Michelle Ciucci (Mentor), Communicative Disorders

Vocal deficits related to Parkinson Disease (PD) negatively impact quality of life. Although voice therapy can be effective, therapy outcomes are often limited. This may be due to diminished carry-over from the clinic to other environments. Examining the effects of context on therapeutic success may improve voice rehabilitation. Because this is logistically difficult to do in humans, we used a rat model of PD and trained 16 rats to vocalize with a vocal training paradigm. Following training, we analyzed the acoustic properties of the ultrasonic vocalizations in two different contexts: familiar training environment (homecage) versus a novel environment. Data analysis is ongoing. Results and implications will be discussed. Findings from this translational project may contribute to our understanding of context of therapy on functional outcomes.

LIFE DRAWING MODELS

Erin Curran, Elizabeth Godec, Zhijie Gu, Elizabeth Pedroza, Ruth Olson (Mentor),
Interdisciplinary Research Programs - Humanities

Our documentary follows two Life Drawing Models, Marcus and Briony, as they relate their motivations, experiences, and philosophies on nude modeling. The documentary also features commentary from Life Drawing Professor Fred Stonehouse, and other academic voices from around the University.

THE MISCHIEVOUS ROBOT

Erin Curran, Stephen Hilyard (Mentor), Art

The Mischievous Robot is a lighthearted digital animation aimed at entertaining audiences.

ARE WE STILL WAITING FOR SUPERMAN?

Dallas Daniel, Shawn Peters (Mentor), Integrated Liberal Studies Program

The University of Wisconsin-Madison is known globally for its academics and for propagating the "Wisconsin Idea." However, the university struggles to maintain a balance between protecting its reputation and opening its doors to a socio-economically diverse population. When those doors are opened, many of those diverse students find it difficult to fulfill the promise of the "Wisconsin idea." The research that I have done explains how the university can improve its high-impact learning practices and create a more inclusive environment. Through an anonymous survey, I have collected data from several dozen undergraduates. These results are used to show how UW-Madison might increase diversity and uphold the retention rate of targeted minority groups.

HEALTHY TEXTS, HEALTHY YOU?

Angela Davis, Megan Moreno (Mentor), Pediatrics

Cell phones have increasingly become like a "sixth finger" for the vast majority of college students. Another increasing commonality among college students is the amount of overweight students. Physical activity and a healthy diet with behavior modification are critical to overcoming this issue. Consequently, the purpose of this research study is to explore the potential impact of text messages on participants' health and well-being. Information gathered from this study will help develop a better understanding of how effective text messaging could be on college student behaviors.

EFFECTS OF BORTEZOMIB AND LENALIDOMIDE ON MACROPHAGES IN MULTIPLE MYELOMA

Ryan Denu, Peiman Hematti (Mentor), Medicine

Multiple myeloma (MM) is a cancer characterized by proliferation of malignant plasma cells in the bone marrow, where they are supported by bone marrow stromal cells, including macrophages. Bortezomib and lenalidomide are drugs used to treat MM, but their mechanisms of action are unclear. In this study we examined the effect of bortezomib and lenalidomide on macrophages' support of MM cells. We found that the ability of macrophages to support the proliferation of MM cells was decreased when macrophages were treated with bortezomib or lenalidomide. This suggests that one potential mechanism of action of bortezomib and lenalidomide is interrupting the supportive role of macrophages in the growth of MM cells. This study also suggests a novel way to treat MM: targeting the macrophage axis of support for MM cells.

RELATIONSHIPS OF WHITE MATTER MICROSTRUCTURE TO MEASURES OF ANXIETY IN CHILDHOOD AND ADOLESCENCE

Dan Destiche, Sharon Lu, Andrew Alexander (Mentor), Medical Physics

Childhood and adolescence are periods of high risk for internalizing disorders--in particular anxiety and mood disorders. In our study, 133 human subjects had cortisol and behavioral measurements taken from birth to grade 12 and were scanned at age 18 with Diffusion Tensor Imaging (DTI) to characterize the microstructure of white matter pathways associated with anxiety. Specifically, we perform image processing and regression analyses to explore correlations between DTI metrics and anxiety measures in order to determine the relation between early life inhibition and adult whole brain white matter microstructure. Our long-term goal is to identify early risk factors for later development of anxiety and mood disorders.

THE FOR COLORED GIRLS PROJECT: BIG BUTT GIRLS, HARD-HEADED WOMEN

Erika Dickerson, Cydney Edwards, Lauren Lugo, Erika Molina, Jo'niece Monk, Thiahera Nurse, Blaire White, Sandra Adell (Mentor), Afro-American Studies

Big Butt Girls, Hard-Headed Women, is a visceral, raw theatre piece based on the lives and times of real incarcerated women. Chronicling Rhodessa Jones, a Black woman hired to teach aerobics in San Fransico's City Jail in 1987, the work explores, analyzes, and uncovers the often-overlooked intersections of race, ethnicity, gender, class, sexual orientation and disability as it relates to incarcerated women of color. The invisibility of women's perspectives in discussions of the growing prison industrial complex constitute a serious gap, given that the number of women in this system are rising at an alarming rate. Through mixed-medium performance art, The FCG Project re/members and humanizes these women while begging the question: Is there a way to retrieve the lives of our sisters and their families?

THE BLACK HAIR POLITICK: BLACK COLLEGIATE WOMEN AT PREDOMINATELY WHITE UNIVERSITIES

Erika Dickerson, Sandra Adell (Mentor), Afro-American Studies

This research investigates the social function of hair in four arenas: biological fact, symbolism, abjectivity, and cultural practice in respect to the lives of six Black collegiate women at predominantly white universities: the University of Wisconsin-Madison and the University of Cape Town. I examine the hair stories of these women with the backdrop of their nation's specific history of racial oppressions by way of apartheid and slavery. In doing so, I uncover several factors that influence the hair styling and maintenance practices of these Black collegiate women, underscoring the effect(s) of the spatial location of a majority white university on such practices. I examine the ways in which these women navigate their experience and understanding of hair as a social marker that sexualizes, racializes, and engenders them. Keywords: hair, politick, social marker, Black women

SORTING SINGLE-WALL CARBON NANOTUBES VIA COLUMN CHROMATOGRAPHY

Paul Dieterle, Michael Arnold (Mentor), Materials Science & Engineering

Semiconducting single-wall carbon nanotubes (s-SWNT) exhibit remarkable electronic and optical properties, such as tunable absorption and bandgaps, high charge mobilities, strong absorption, and photo-thermal stability. These properties make s-SWNTs ideal candidates for next-generation solar cells. However, such devices require pure s-SWNT samples, and current synthetic methods grow carbon nanotubes containing metallic and semiconducting varieties. Here, we study gel chromatography as a potentially scalable method for sorting S-SWNT based on chirality and electronic type. Gel chromatography involves the use of a surfactant - sodium dodecyl sulfate (SDS) - to selectively disperse s-SWNT. We report on the optimization of this technique with respect to purity and yield of s-SWNT samples. Such optimization ensures industrial feasibility of S-SWNT based devices.

THE IMPORTANCE OF PROTEIN RESIDUE CONFORMATIONS LEAD TO CATION-PI INTERACTION IN PROTEIN-DNA COMPLEX

Yuanhao Ding, Julie Mitchell (Mentor), Biochemistry

Protein-DNA interactions play a paramount role in numerous biological processes. Protein and DNA binding interfaces can form a stair like structure when positively charged residues such as Lysine and Arginine bind to the aromatic ring of DNA base. This project uses data from the Protein Data Bank to analyze the result calculated by a computer program to determine protein residue geometries that might give rise to cation-pi interaction on the binding interface of protein-DNA complexes. By determining whether these residue conformations are established prior to or after binding with DNA, we can obtain information on the binding mechanism of protein-DNA interaction. This information can be of use in designing new protein structures that bind with DNA.

LYOTROPIC LIQUID CRYSTALLINE PHASE BEHAVIOR OF DODECENYLSUCCINATE IN AQUEOUS MEDIA

Kimberly Dinh, Mahesh Mahanthappa (Mentor), Chemistry

Small molecule surfactants self-assemble in aqueous media to form lyotropic liquid crystals (LLCs) that exhibit long-range translational nanoscale order. LLCs form spherical, hexagonal, lamellar, and bicontinuous cubic morphologies. I am investigating the synthesis and phase behavior of the double-headed single-tailed surfactant sodium dodecenylsuccinate. Analysis of its aqueous LLC phase behavior using polarized light transmission studies and small-angle X-ray scattering will be presented. Preliminary polarized light transmission studies indicate LLCs of 45-60 wt% sodium dodecenylsuccinate self-assemble into cubic liquid crystalline phases. Given these results, I am working to map the phase behavior of these systems as a function of surfactant composition and counterion. These self-assembled systems exhibit potential for application as media for selective chemical separations and in selective ion transport applications, including fuel cell membranes.

HAND HYGIENE & INFECTION CONTROL ANALYSIS

Kevin Dinh, Nasia Safdar (Mentor), Medicine

Throughout all inpatient units at the UW-Health Hospital and Clinics, observations of hand hygiene practice of various healthcare workers are observed in accordance to recommended standards from the World Health Organization (WHO). Hospital acquired infections are responsible for greater lengths of hospitalization and increased hospital costs; hand hygiene is a crucial component in prevention of these infections occurring. A student team collects hand hygiene observations of all employees within the hospital and records of employees in accordance with policy. In effort to eliminate hospital acquired infections, the goal of this research is ultimately to observe the issues in the current practice and create better methods of informing the staff when they are not in compliance with the policy.

NON-PHARMACOLOGICAL PAIN MANAGEMENT MODALITIES: NURSES HELPING ELIMINATE THE GAP

Jennifer Donahue, Rachel Borucki, Libbie Nyarangi, Dylan Van Lith, Melissa Franz, Ana Schaper (Mentor), Nursing

The National Database of Nursing Quality Indicators (NDNQI) is a national nursing database that evaluates nursing care. In an attempt to improve pain care and outcomes, NDNQI sponsored a national study in which data were collected directly from patients to gain their perspective on pain and pain management. Gundersen Lutheran was one of 400 hospitals to participate in this research. Data were collected from eligible patients on one day in April and November of 2011. The study results suggest that approximately 80 percent of a patient's pain is managed pharmacologically. Research indicates that complementary care modalities such as music and massage are effective in reducing pain. Nurses through a caring-healing relationship with patients can use these complimentary modalities to decrease this gap in pain management.

AIAM - ATHLETIC APPAREL FOR SWIMMERS

Caelainn Donnellan, Jennifer Angus (Mentor), Design Studies

AIAM is a line of clothing that aims to change the problems of boring and ill-fitting apparel by selling swimmer-oriented athletic clothing. All apparel and suits have sophisticated cuts, fabrics, and patterns and allow for customization of color and pattern. We also offer an out-of-water line for use in cross-training workouts or for competitions. The apparel in this line allows for the broader, well-developed shoulders of swimmers and, like the suits, is available in short, regular, or tall lengths. Aiam's competition warmups feature the same warm, quick drying material found in Underarmour's winter running clothes. Along areas that get wet quickly and stay wet the longest, there is self-heating fabric that warms up when it gets wet.

EFFECT OF FGF2 GRADIENTS ON HUMAN NEURAL PROGENITOR CELLS IN MICROFLUIDIC DEVICES

James Dorrance, Thomas Keenan (Mentor), Biomedical Engineering

Fibroblast growth factor-2 (FGF2) influences human neural progenitor cell (hNPC) proliferation and differentiation. hNPCs exposed to FGF2 gradients in cell cultures may form architecture similar to that of a developing brain. In this study the hNPCs were exposed to FGF2 gradients and the distribution and number of hNPCs, neurons, and intermediate progenitor cells (IPCs) were examined. These results will make the role of in vivo FGF2 gradients clearer and bring us one step closer to the ultimate goal of engineering higher order neural tissue types.

THE RELATIONSHIP BETWEEN FETAL IRON DEFICIENCY AND THE PRESENCE OF ASTHMA BIOMARKERS AT BIRTH

Natalie Dosch, Pamela Kling (Mentor), Pediatrics

Maternal obesity and diabetes have been linked to both iron deficiency (ID) and the development of asthma in infants. Our research goal is to explore the relationship between ID and predominance of allergic lymphocyte white blood cells as a marker of asthma in umbilical cord blood. We hypothesize that cord blood from newborns with high risk for ID will have the lowest iron status and the greatest allergic-type lymphocyte imbalance. Samples are obtained after C-section deliveries of newborns at risk for ID (maternal obesity/diabetes) and those without (controls). Blood is processed for iron status and lymphocytes are grown in cell culture to measure production of allergic-type proteins. Results could improve identification of infants predestined for allergic asthma, allowing for early intervention and treatment.

THE PURSUIT OF A COLLEGE EDUCATION IN THE LAO AMERICAN COMMUNITY: IMPACT OF GENERATIONAL STATUS

Saengthong Douangdara, Alberta Gloria (Mentor),

The purpose of this study is to examine the 1.5- and the second generation of Lao Americans in the college environment. It assesses the role of generation status and how family experiences and ethnic identity affect a Lao student's college adjustment. It is questioned as to how the second-generation children may have grown up differently than the 1.5-generation. The current study utilizes a questionnaire created with the Asian American Family Conflicts Scale, the Multigroup Ethnic Identity Measure 1999, the University Environment Scale, and the Cultural Congruity Scale. It is anticipated that the questionnaire results will reveal a difference between the two generations and will create more answers to the areas of support the two generations may need in their college experience.

ALCOHOL INCREASES PREFERENCE FOR RISK BY REDUCING SENSITIVITY TO UNCERTAINTY

Stephanie Dresen, Mark Starr (Mentor), John Curtin (Mentor), Psychology

Despite empirical and anecdotal evidence linking intoxication with risk-taking, current models lack sensitivity to identify the processes affected by alcohol that impair decision-making and drive preference for risk. The current study will test if intoxication increases the subjective value of risk and biases behavior toward objectively unfavorable choices in a gambling task. While holding objective value constant, we will test if knowledge about the probability of winning influences the subjective value of gambling. We predict when the probability of winning is known, all participants will gamble with equal frequency. But, when the probability of winning is unknown, intoxicated participants will gamble more often than sober controls. This research may help clarify alcohol's effect on decision-making by more closely modeling risk-taking behavior outside the laboratory.

IMPACT OF LOGGING ON FIRE FREQUENCY: CIRCLE LILY LAKE, WISCONSIN

Margaret Durow, Jennifer Schmitz (Mentor), Limnology and Marine Science Program

My research looks at the effects of natural and human disturbances in the forest ecosystems around Circle Lily Lake, Wisconsin. Periodic fires can help maintain forest composition by burning smaller brush on the forest floor, allowing larger, fire-adapted tree species to thrive. Before European settlement, fires occurred periodically around Circle Lily Lake. In the mid-1800s, these old-growth forests were clear cut. I will analyze lake sediment samples from Circle Lily Lake to look at changes in fire frequency during and after the logging period. Vegetation at the time of burning will also be analyzed. Fire frequency is expected to decrease after logging, allowing smaller fire-sensitive species to thrive, creating a more closed canopy forest.

THE EFFECTS OF HMG-COA REDUCTASE INHIBITORS ON VALVULAR INTERSTITIAL CELL GENE EXPRESSION

Kelsey Duxstad, Chloe Mccoy (Mentor), Biomedical Engineering

HMG-CoA reductase inhibitors (statins) are a class of drug that are used to reduce cholesterol and prevent atherosclerosis. The response of porcine valvular interstitial cell (VIC) to statins was researched to explore the pharmacological impact of the drug on Calcific Aortic Valve Disease (CAVD). In addition, sex-related differences were also investigated since male sex is a clinical risk factor for CAVD. VIC gene expression was measured using reverse-transcriptase Polymerase Chain Reaction during seven days of cell culture. Research has shown that diseased VICs undergo two types of differentiation down osteoblast-like and myofibroblast-like lineages. The genes selected for RT-PCR help determine which differentiation is occurring. The results reveal that there are significant differences in disease-related gene expression between sexes in response to statin treatment. This finding helps us deduce the differing effects of statins on male and female VICs.

CHEMISTRY OF THE BRADY SOIL

Ross Edel, Nina Chaopricha (Mentor), Geography

The Brady Soil, an ancient buried layer in the Great Plains that formed after the last Ice Age, is dark in color due to its organic matter. If unstable, this carbon could be released to the atmosphere as greenhouse gases. My role in the project was to help separate the soil by particle size, isolating the dark portion for study. Subsequent geochemical analysis indicated that the dark organic matter is protected within soil aggregates, hard for bacteria to access, and composed of stable molecules difficult to digest. Therefore, it is unlikely that the Brady Soil will contribute atmospheric carbon.

ESTRUENDOMUDO-PERUVIAN INDEPENDENT PUBLISHING HOUSE, AN INNOVATIVE APPROACH

Ann Marie Edlebeck, Ksenija Bilbija (Mentor), Latin American, Caribbean and Iberian Studies

From an international perspective, the focus of my Hilldale study provided me with the opportunity to conduct a comprehensive research project in the heart of the up-incoming literary movement of Lima, Peru. In concentrating my investigation on Estruendomudo, one of Lima's most well known and rapidly growing editorial companies, I was able to highlight the history, structure, funding source, and distribution methods of this new organization. Through individual interviews with the publishing company's founder, staff team, as well as featured authors, I gathered a wide variety of information regarding the company's functionality and team dynamic. In researching Estruendomudo throughout my semester in Peru, I grasped a holistic understanding of the organization's collaborative vision and work ethic in creating and distributing Peruvian literature to the masses.

PEER-REVIEW AT NATIONAL INSTITUTES OF HEALTH (NIH): IS THERE BIAS AGAINST WOMEN R01 GRANTSAPPLICANTS

Shenell Edwards, Mary Carnes (Mentor), Medicine

The purpose of this research is to examine if peer-review at the National Institutes of Health (NIH) poses a barrier to female Research Project Grant (R01) applicants. Though previous studies have identified that women have lower success rates for R01s than men, no study has examined the text of grant reviews for descriptive or evaluative differences. In our preliminary analyses, we found that among R01 grant recipients at the University of Wisconsin, Madison in 2008, the language in women's compared to men's grant reviews indicated that women may be held to higher standards than men for funding. To test the generalizability of these results, we are preparing to collect grant reviews from a random sample of all R01 grant recipients in 2008. Methods for sampling and data analysis will be discussed.

PROJECT READ

Ellen Ehlers, Melinda Leko (Mentor), Rehabilitation Psychology & Special Education

The goal of this research is to improve current professional development programs by determining the effect of special education teachers' reading preparation and how that impacts their teaching practices in the classroom. The first aspect of our research is a qualitative assessment of teacher preparation by using a grounded theory to code ten teacher's interviews. The next phase of research involves a quantitative assessment of teacher preparation through a survey that will be sent out to every special education teacher in Wisconsin. The data that we collect from these two phases of research will help us develop better professional development programs that are targeted at teachers needs which will, in turn, better the educational experiences of their students.

HOW DOES CALCIUM BINDING LEAD TO SYNAPTOTAGMIN 1 ACTIVATION?

Stefan Elde, Chantell Evans (Mentor), Neuroscience

For 50 years it has been known that the rapid influx of Ca²⁺ triggers the fusion of SV (synaptic vesicles) with the plasma membrane, and consequently regulates the release of neurotransmitters (Thomas, 1969). This fusion is facilitated by SNARE (soluble [N-ethylmaleimide-sensitive factor] attachment protein receptor) proteins, which are the minimal fusion machinery required. Syt1 (synaptotagmin 1), a Ca²⁺ binding SV protein, is thought to confer Ca²⁺ sensitivity to this process. However the mechanism by which syt1 facilitates fusion is unclear. Ca²⁺ binding is coordinated by aspartic acid residues found in both C2 domains of the protein (figure 1b) (Fernandez-Chacon et al, 2002 and Ubach et al, 1998). Through point mutations, we can begin to investigate how Ca²⁺ binding leads to syt1 activation. Single neutralizations of aspartic acid residues to asparagine allow us to determine the overall contribution of each residue to Ca²⁺ binding and syt1 activation, which will be measured by in vitro aggregation and fusion assays. These assays will allow us to begin to understand the Ca²⁺ requirement for syt1 activation and how that governs syt1-mediated fusion.

QUALITY OF DOMESTIC CAR COMPANIES

Aaron Elizondo, Justin Sydnor (Mentor), Business

In today's car market there is a certain perception that foreign cars are better quality vehicles than domestically made cars. In recent years this perception seems to be disappearing and the public is starting to believe that domestically made cars are improving in their quality. To test this we look to a leading car site Edmunds.com for data. Here they have predicted depreciation values for new and older model cars. We can look at the depreciation values of domestic and foreign made cars in past and recent years to see if they differ. If domestic cars are improving, then the depreciation values for domestic cars should be getting smaller while foreign cars should stay the same.

GAMING CONVENTIONS: WHO ATTENDS AND WHY

Jonathan Elmergreen, Crystle Martin (Mentor), Curriculum and Instruction

Gaming Conventions, and the culture that has exploded within them, have become increasingly prominent in popular culture and among younger audiences. Although research exists on isolated topics within gaming conventions, little data exists on conventions themselves. In this study, data was collected via a survey administered at a general gaming convention. The focus was to simply gain a broad understanding of the types of individuals attending gaming conventions, as well as preliminary data on the particular reasons they chose to attend or engage in various activities at the convention. Initial data analysis suggests younger populations comprise the majority of attendees, females attend more than males, and that the primary reason for attendance is socially based.

INFLAMMATION CONTRIBUTES TO DEPRESSION FOLLOWING HEMATOPOIETIC STEM CELL TRANSPLANTATION

Alexandra Erdmann, Erin Costanzo (Mentor), Psychiatry

Prior research indicates that inflammatory responses can activate central nervous system pathways that evoke changes in mood. This study examined relationships between markers of inflammation and depression following hematopoietic stem cell transplantation (HSCT). Cancer patients undergoing HSCT (N=101) completed measures of depressive symptoms at 1, 3, and 6 months post-transplant. Proinflammatory (IL-6, TNF α) and regulatory (IL-10) cytokines were assessed by ELISA in peripheral blood plasma. Mixed-effects linear regression models indicated that patients with elevated IL-6 and IL-10 reported more severe depressive symptoms at the post-transplant assessments ($z=2.46-3.46$, $ps <.05$). Follow-up analyses clarified that relationships were strongest for neurovegetative, rather than cognitive/affective, symptoms of depression. Findings suggest a potential treatment-related cause of depression that could be targeted to improve the quality of life of HSCT recipients.

RECYCLING DICTATORS: EX-AUTHORITARIANS IN NEW DEMOCRACIES

Sarah Eucalano, Brett Kyle (Mentor), Political Science

This research project seeks to identify the role recycled dictators have in presidential elections in states in Latin America that endured military rule and transitioned to democracy during the Third Wave of democratization. Recycled dictators served in government or in the armed forces during a period of military dictatorship, and later run for public office under the new democracy. The research assignment involves using newspaper databases and search engines to find articles about the elections of candidates who were part of the military dictatorship. Knowing the role recycled dictators have in democratic elections can show why people support or reject candidates associated with the authoritarian past, and how recycled dictators can be incorporated into democracies.

ANTHOCYANINS AND STRUCTURAL GENES OF CARROTS

Gabriel Fabela, Philipp Simon (Mentor), Horticulture

The main objective of this project is to determine the genetic map location of the anthocyanin pigment genes in carrots. The accumulation of purple and blue anthocyanin pigment varies in different carrot genotypes, and although some preliminary genetic evidence has been gathered in regards to this trait, the genetic map location of anthocyanin biosynthesis gene is unknown. This projects aims to determine this location by using methods such as NCBI data based evaluation, primer design, PCR, and genetic mapping.

THE GENDER INEQUALITY WITH LEADERSHIP ROLES IN FAMILY BUSINESSES

Mia Fabishak, Debra Holschuh-Houden (Mentor), Business Outreach

Throughout history women have struggled to establish equality and end gender discrimination in the workplace. Family businesses are no exception to this issue especially with gaining leadership roles and determining succession. I will conduct my research through surveys and interviews of various family businesses and non-family businesses and compare the percentage of women to men of past generation's succession and other leadership roles. Specifically I want to see if working in a family business is a positive or negative for women in the family looking to gain leadership in a company.

THE DEVELOPMENT AND IMPLICATIONS OF ORGANIZED CRIME IN SERBIA

Kyle Farrell, Tomislav Longinovic (Mentor), Slavic Languages

The research will chronicle nascent displays of banditry as perpetrated by the Serbian outlaws that rebelled against Ottoman authority, will recount the actions taken by the Serbian mafia during the Yugoslav Wars of the 1990s, and will chronicle the post-Yugoslav efforts by the Serbian government to mitigate the mafia's influence in the region. It will also analyze the dichotomous nature of criminal activity - the distinction between a "Robin Hood" outlaw versus an outlaw fulfilling the exploitive, self-serving "gangster" archetype. The research will comment on the political implications of Serbian organized crime such as the effect the mafia's presence will have on Serbia's bids for EU candidacy or the mafia's ability to corrupt public officials and coerce policy by use of force or intimidation.

SOCIAL ADAPTATIONS OF FRESHMAN TO A UNIVERSITY ATMOSPHERE

Oren Feldman-Schultz, B Brown (Mentor), Educational Psychology

The purpose of the study is to identify factors affecting students' social adjustment to college and exploring associations between social adjustment and academic success as well as more general measures of psychosocial well-being. Our team has gathered self-report survey data and then engaged in intensive interviews with 33 freshmen; the audiotaped interviews are being transcribed to facilitate data analyses. A special interest in this project is the role that social media (especially, Facebook) play in students' social adjustment to college. Quantitative and qualitative analyses of the data will be conducted to identify the ways in which students negotiate the social challenges of college. It is anticipated that findings will have implications for the design of college programs and environments to foster better integration of students into the University.

UNTITLED

Lauren Fergus, Jack Damer (Mentor), Art

This project was about taking objects that would be considered of little artistic concern and then exploring how those objects can be manipulated and varied to develop into an image of interest. My project used the repetition of wheels and other machinery to form an image that flowed in a natural way, contrasting the mechanical objects that shaped it. The lines and fill added after the transfer of the varied Xerox images are meant to emphasize the individual objects working as a whole to form the flowing image, much like the gears of a machine. The process of the lithographic print also further adds to the idea of repetition and machinery seen.

DIFFERENTIATION OF MSCS TO CHONDROCYTIC LINEAGE AND DEMONSTRATE EXPRESSION OF COLLAGEN AND AGGREGAN

Mary Finedore, Neehar Bhatia (Mentor), Medicine

Mesenchymal stromal stem cells (MSC) are multipotent nonhematopoietic stem cells. These cells have a high capability of proliferating and differentiating into several lineages such as osteoblasts (bone), adipocytes (fat), and chondrocytes (cartilage). I will derive MSCs from bone marrow of patients and induce chondrocytic differentiation. I will demonstrate expression of collagen-2 and aggrecan in the chondrocytic culture. We will attempt to perform quantitative analysis off of chondrocytic differentiation between samples. Scientists hope MSCs maybe used for tissue repair and cellular therapy. The use of MSCs in transplant patients with any tissue damage would have immense benefits because these cells are predicted to not only help reduce the chance of graft vs. host disease in transplant patients.

PROTEIN KINASE CE, AN INITIAL SIGNAL IN PROSTATE CANCER DEVELOPMENT AND METASTASIS.

Joseph Fischer, Bilal Hafeez (Mentor), Human Oncology

Prostate cancer (PCa) is the second most common malignancy in men and the second leading cause of cancer-related deaths in the Western World. We present here that PKC ϵ is an initial signal for cell survival signaling pathways, which are involved in androgen-independent (AI) activation of AR and promotion of PCa cell survival for emergence and progression of castration resistant prostate cancer (CRPC). We have observed that PKC ϵ deletion in TRAMP mice prevents PCa development and metastasis. Over-expression of PKC ϵ , via adenoviral infection, increased the interaction of Stat3 with AR and EGFR interaction with AR, which are all up-regulated in PCa. We conclude that PKC ϵ -mediated Stat3 and EGFR activation and subsequent interaction with AR are essential components of the emergence and progression of CRPC.

THE EFFECTS OF IFI202B AND AIM2 ON HEPATOCELLULAR CARCINOMA

Adam Fisher, Andrea Bilger (Mentor), Oncology

The gene(s) responsible for hepatocellular carcinoma in people have been difficult to detect because of interference of environmental factors. In mice, susceptibility was mapped to a 3.3 MB region which includes the gene *Ifi202b*, *Aim2*, and 43 others. Microarray analysis of gene expression suggests that *Ifi202b* and *Aim2* can explain the susceptibility of a variety of mouse strains. The expression of these genes was tested independently for changes in expression level in various strains of mice using a standard qPCR protocol. The changes in expression level were also compared to previous microarray data. Discoveries made through this research could help determine whether functional equivalents in humans are a worthy target for pharmacological intervention.

PROJECT GROW: TALKING TOGETHER

Ashley Fittante, Cynthia Burnson, Julie Poehlmann (Mentor), Human Development & Family Studies

Project GROW: Talking Together is a community-based research project. Project GROW is an intervention program that strives to improve the school readiness skills of low-income preschoolers. Talking Together focuses on evaluating ways to improve Project GROW's future ability to meet the needs of low-income children, their families and our community partners. During the 2011-2012 academic year, we have conducted interviews and focus groups with families, teachers, and adult college students involved in Project GROW. Our three main research questions are: (1) Will dialogic reading intervention affect family reading habits in low-income families with preschoolers? (2) Will the dialogic reading intervention affect school readiness skills in low-income preschoolers? (3) How can we improve Project Grow, according to input from families, teachers, and college students?

THE LINK BETWEEN MARITAL CONFLICT AND ADOLESCENTS' NEGATIVE COGNITIVE STYLE AND DEPRESSION

Holly Flores, Janet Hyde (Mentor), Psychology

While some research has shown that interparental conflict is related to depression in adolescence, it is still unclear what mechanisms underlie this relationship. I proposed that because marital conflict is an unavoidable stressor in the lives of many children, negative cognitive style mediates this relationship. Data from 307 adolescents (149 boys, 158 girls), 307 mothers, and 296 fathers were used from the longitudinal Wisconsin Study of Families and Work. Results showed that depression at age 15 was significantly correlated with exposure to marital conflict at age 13, but not at earlier ages. Negative cognitive style at age 13 was not correlated with exposure to marital conflict at any age. These data provide a better understanding of the link between marital conflict and adolescent depression.

ROLE OF FLOTILLIN-2 IN NEURAL DEVELOPMENT

Kassandra Ford, Mary Halloran (Mentor), Zoology

Flotillin-2 (flot-2) is a scaffolding protein that has been implicated in neural differentiation. We are investigating a potential function for flot-2 in axon development. We obtained a mutant zebrafish line with an insertion in the flot-2 gene. My project is to genotype the zebrafish DNA to identify each fish as a wild-type, heterozygous or homozygous mutant in the flot-2 lines. I extract DNA and use a PCR reaction to test for the presence of the insertion. Our analysis of identified homozygous mutants suggests flot-2 functions to control motor axon growth and guidance. With the findings of this research, more will be learned about neural development and the specifics of some developmental diseases.

IMMUNOLOCALIZATION OF AGONIST INDUCED FOS AND RECEPTOR SPECIFIC ANTIBODY BINDING OF 5HT2A-R

Rachel Foreman, Mark Brownfield (Mentor), Comparative Biosciences

The aim of this study is mapping distribution of a functional response by 5HT2A receptors: locating the distribution of the 5-HT2A receptor-responsive neurons (by their expression of nuclear fos protein after injection of the potent, selective 5HT2A agonist TCB-2) in male Sprague-dawley rats. After locating fos expressing cells light microscopic immunocytochemistry was used to determine whether the involvement and location of 5-HT2A responsive cells is consistent with reported distribution of 5-HT2A receptors. Immunolocalization focused on the rat thalamus, hypothalamus, cortex, hippocampus, cerebellum, spinal cord and caudal brainstem. The receptor antibody used was determined to be the only selective antibody available, as determined by another lab. This receptor has been linked to numerous neuropsychiatric disorders including but not limited to: anxiety, schizophrenia, and bipolar disorder.

YOUNG CHILDREN'S DRAWING AND WORD LEARNING CAPABILITIES THROUGH TOUCHSCREEN APPLICATIONS

Taylor Fulmer, Ashley Brennan, Kelly Lyke, Alexandra Nicholas, Kristin Shafer, Heather Kirkorian (Mentor), Human Development & Family Studies

While toddler utilization of interactive touchscreen media rises, little research exists revealing how young children engage with and if at all, benefit from these devices. To understand young children's drawing capability on touchscreens, three to five year old children in Study 1 drew assigned images on both paper and a touchscreen. Preliminary data suggest children draw more complex, detailed images on paper as compared to touchscreens. To examine language learning ability via touchscreen, toddlers in Study 2 will touch or watch a touchscreen video that introduces a novel word and novel item. Testing their accuracy to pair the novel word with the unfamiliar object, we anticipate toddlers in the "touch" condition to more readily learn the new word than toddlers who are sedentary observers.

CHILDREN'S MEMORY AND THE EFFECTS OF GENERALIZABILITY

Mary Galle, Charles Kalish (Mentor), Educational Psychology

Children are constantly encountering new information, making it impossible to encode every detail. We are looking to find the information children are likely to encode. We have hypothesized that memory processes and children's generalization are linked so generalizable information is better encoded than information specific to individuals and that they remember specific people better when they are learning information specific to the person compared to learning information generalizable to a group. In this study, children receive information that is generalizable or specific to an individual. They are then asked to recall specific individuals and what property they learned. Preliminary results confirm our hypothesis, showing that generalizability of information does matter. These results could affect the way examples are presented to children in an educational context.

THE EFFECTS OF FOLIC ACID ON PERIPHERAL NERVOUS SYSEM REGENERATION

Wil Gibb, Emily Skarda, Bermans Iskandar (Mentor), Neurosurgery

Injuries to the peripheral nervous system (PNS) are very common, such as neuropathies caused by trauma, diabetes, or HIV. Our lab has shown folic acid (FA) can stimulate axon regeneration in the central nervous system after injury, but folate's role in the PNS has not yet been examined. We propose to examine folate's effects on axon regeneration in dorsal root ganglion (DRG) neurons following sciatic nerve injury. Rats are divided into two groups: intraperitoneal folate treatment, and vehicle control. The animals sustained a left sciatic nerve crush injury. Four days postoperatively, the DRG are removed and placed in a culture medium to grow. Based on preliminary evidence, we hypothesize that FA enhances axonal re-growth after injury. Success of this research would have significant clinical impact.

THE DIAGNOSTIC PROCESS OF BORDERLINE PERSONALITY DISORDER

Grant Gigot, Elizabeth Muenchow, Annabelle Potvin, Sandra Sulzer (Mentor), Sociology

This project investigated the clinical experience of individuals with borderline personality disorder (BPD) to understand the disparities present in the diagnostic process. Previous literature indicated that many clinicians refrained from revealing the diagnosis to their patients. In our study, we interviewed 21 clinicians with 10 patient interviews planned. Through analysis of transcribed interview data, we identified two main themes. The first was of an underlying stigma of BPD which created a perception of risk and disadvantage for the patient, pressuring clinicians to avoid placing this diagnosis. The second was clinicians' uncertainty over whether insurance would cover treatment for the disorder, also shaping diagnostic decisions. Research in this area will enhance knowledge of what happens in clinical practice in hopes that patients will receive better care.

LIONS, JAGUARS, AND LEOPARDS, OH MY! THE ROLE OF LOCAL COMMUNITIES IN BIG CAT CONSERVATION

Brittany Gilles, James Berkelman (Mentor), Forest & Wildlife Ecology

"Big cats" (genus *Panthera*) are a highly threatened group of predators, and a variety of cultures currently face challenges in their attempt to coexist with them. Predators, specifically the Panthera, are important to the functioning of their ecosystems, which are currently facing large changes. Our research focused on a literature review of case studies on conservation efforts towards lions in the Maasai lands of eastern Africa, snow leopards in the Himalayas, and jaguars in Mexico. We found that all three cats faced similar threats, including habitat loss and human-animal conflicts. The results in each case study indicate successful strategies for community-based conservation of big cats.

THE RELATIONSHIP OF STRESS, ANXIETY, AND DEPRESSION WITH ACADEMIC ACHIEVEMENT AMONG COLLEGE STUDENTS

Jaimee Goldish, Megan Moreno (Mentor), Pediatrics

College students are prone to experiencing symptoms of stress, anxiety, and depression. These psychological symptoms can influence academic achievement. Recent studies failed to measure the correlation of stress, anxiety, and depression, with GPA. The purpose of this study was to examine the relationship between these conditions in comparison with grade point averages of university students. This was a secondary analysis of previously collected data of 274 UW college students. The research is not complete at this moment, but a positive relationship between symptoms of stress and GPA is anticipated.

HEALTHY CHOICES: MADE EASY BY WAUPACA EATING SMART

Josie Golembiewski, Ana Martinez-Donate (Mentor), Population Health Sciences

In order to address rising rates of obesity and chronic disease, a new community nutrition initiative, Waupaca Eating Smart (WES), was formed. As part of WES, educational materials were created to label and promote healthier food choices in participating restaurants and grocery stores to make it easier for customers to choose healthy items. In restaurants, materials include menu inserts, table tents, and wait staff pins. In grocery stores, materials include displays, recipe cards, point-of-purchase signs, and flyers. The project will evaluate sales of healthy WES-approved meals compared to regular meals in restaurants and purchases of seasonal WES-promoted fruits and vegetables compared to baseline in grocery stores. Through these efforts, Waupaca Eating Smart aims to improve the food environment and make Waupaca healthier.

ASSESSING ALCOHOL ABUSE STATISTICS THROUGH DATA ANALYSIS OF SOCIAL NETWORKING DATA

Jesse Gomer, Adam Maus (Mentor), Industrial Engineering

We are developing a data mining system that uses social media combined with data analysis techniques to investigate how Twitter data, related to alcohol abuse, correlate with regional statistics such as the number of alcohol related car accidents in a specific region. We use publicly available Twitter data alongside natural language processing algorithms to develop a strategy for classifying, aggregating, and testing correlations between Twitter data and statistical data on the number of DUIs in the Los Angeles area. Correlations between social networking and statistical data could be used to identify locations where other statistical data are not accurate.

COMPARISON OF INTERNET DISTRACTION AMONG COLLEGE STUDENTS WITH AND WITHOUT ADHD

Natalie Goniou, Megan Moreno (Mentor), Pediatrics

The purpose of our study was to determine whether individuals with undiagnosed ADHD are more distracted by the Internet than individuals without ADHD. We distributed a survey to college students at a large state university containing questions regarding their Internet use, whether they feel distracted by the Internet, and whether they have been diagnosed with ADHD. Thus far, we have distributed 68 surveys. No participants have reported being diagnosed with ADHD, but 14 have been classified as "at-risk" for ADHD based on their responses to an Adult ADHD Self-Report Scale. Of the 14, only 3 believe they have ADHD. 65 participants have said they feel distracted by the Internet, 13 of which were at-risk for ADHD. Final analysis will be complete by URS.

RESEARCH IN COMMUNITIES

Michelle Gonzalez, Maricruz Magana (Mentor), Social Work

While there have been communities participating alongside academic researchers for a long time, there have always been many issues, factors, and situations that have played a role in the participation of the communities. The feelings of not being included and overpowered may affect the outcome of a research study. This project's objective is to measure whether the degree of participation matters in communities involved in research. By interviewing the project managers from community-based research projects, we can obtain a perspective on the factors and processes that were beneficial in the participation of community partners overtime. By analyzing the particular projects and interviews, we hope to find common themes that come forth, as well as lessons learned. The useful tips and lessons obtained from this study will be helpful for other community-based research projects that involve community partners.

IDENTIFICATION OF THE MECHANISM FOR TCDD-MEDIATED DOWNREGULATION OF SOX9B IN ZEBRAFISH EMBRYOS

Alex Gooding, Warren Heideman (Mentor), Pharmaceutical Sciences

2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) exerts toxic effects on zebrafish during embryogenesis, one of which being craniofacial malformations, an aberrant phenotype caused by TCDD's nearly 15-fold downregulation of sox9b transcript abundance in the jaws of zebrafish embryos. We currently seek to determine the exact mechanism by which TCDD induces sox9b downregulation. Initial efforts led to the development of an in vivo EGFP reporter assay in which varying lengths of the sox9b promoter were inserted into the zebrafish genome. These transgenic fish reveal regions of the sox9b promoter that are critical to tissue specific sox9b expression. Furthermore, phospho-histone-H3 fluorescence staining reveals that TCDD decreases the rate of proliferation in cells of the ceratohyal cartilage. Such data provide evidence that TCDD decreases chondrocyte proliferation in a tissue specific, sox9b-mediated manner.

CORTISOL AND BMI AS PREDICTORS OF ANXIETY AND EATING DISORDER SYMPTOMS IN CHILDREN AND ADOLESCENTS

Erica Goodman, Harold Goldsmith (Mentor), Psychology

Anxiety and eating disorders are problematic psychopathologies in children and adolescents. Research indicates that cortisol, a stress-related hormone, and body mass index (BMI) may be factors in the development of these disorders. The present study aims to determine if cortisol and BMI predict anxiety and eating disorders. 398 adolescents participating in the Wisconsin Twin Project (WTP) and their parents completed anxiety questionnaires at ages 7 and 14, and eating disorder questionnaires at age 14. Cortisol was found by assaying saliva samples at age 7. BMI was calculated from height and weight measurements at ages 7 and 14. The results of this study will contribute to an understanding of the biological underpinnings of anxiety and eating disorders.

THE ROLE OF TAC1 IN MSC-MEDIATED LYMPHOCYTE SUPPRESSION

Claudia Goodsett, Peiman Hematti (Mentor), Medicine

TAC1 is a transmembrane receptor expressed predominantly on the cell surface of activated T and B lymphocytes (PBMCs). TAC1 overexpression has been linked to autoimmunity. Mesenchymal Stem Cells (MSCs) are a novel therapy for autoimmunity, as MSCs can suppress autoreactive PBMC proliferation. We hypothesized that co-culture of MSCs with activated PBMCs would block the effects of TAC1. Therefore, we activated PBMCs in the presence of TAC1 blocking antibody and MSCs. We found the antibody blocked the proliferation of activated PBMCs cultured without MSCs, but was less effective in co-culture. We also found that TAC1 was highly expressed on MSCs. Thus, TAC1 on MSCs may provide a decoy for ligands activating TAC1 on PBMCs. MSC treatment may eventually help autoimmune disease patients mediate inflammatory responses.

NEUTROPHIL RECRUITMENT TO A. FUMIGATUS SECONDARY FUNGAL METABOLITES

Jake Greenway, Erwin Berthier (Mentor), Medical Microbiology

The innate immune system locates foreign invaders such as bacteria and fungi through a process called chemotaxis, where neutrophils sense a gradient of signals originating from the pathogen. Bacterial compounds, such as fMLP, are known to cause an immune response, however few fungal compounds have been identified. In our research we use microfluidic assays to create a controlled gradient of compounds, which we test for neutrophil recruitment. We have found strains of *A. Fumigatus*, noticeably those lacking the *ppoA* enzyme, that alter neutrophil migration. We are collaborating with researchers from USC to fractionate supernatant samples of *A. Fumigatus* fungi using LC-MS, to identify the fraction inducing the neutrophil recruitment. Ultimately, we hope to discover the compound(s) produced by *A. Fumigatus* that elicit an immune response.

NEURONAL GROWTH CONES MAY USE INVADOPODIA TO DEGRADE ECM FOR AXON GUIDANCE

Kelly Gregus, Timothy Gomez (Mentor), Neuroscience

During development, complex neuronal circuits assemble through guided extension of axons to their correct synaptic target sites. Growth cones at the tips of developing axons use molecular guidance cues in their environment to guide axons to distant targets. Growth cones integrate signals generated through receptor interactions that often occur at the tips of antenna-like protrusions known as filopodia. Other highly motile cells, such as metastatic cells, have similar structures called invadopodia that protrude from their basal surface and degrade their environment in order to travel through and invade tissues. I find that growth cones have similar basal structures that resemble invadopodia and I hypothesize that these cellular specializations may function to degrade extracellular matrix proteins to guide axons through three dimensional tissues.

FATTY-ACYL CARNITINE MEDIATED INSULIN SECRETION

Alberto Guerra, Mufaddal Soni (Mentor), Biochemistry

Type 2 diabetes mellitus is a metabolic disease caused by loss of β -cell function and reduction in insulin secretion. Insulin secretion regulation is achieved through cellular mechanisms and we have identified miRNA 132 and 212 as regulators and up-regulation of these miRNAs enhance insulin secretion. CACT, a protein responsible for performing β -oxidation in cells have been found to be most down-regulated due to up-regulation of the miRNAs. This study will investigate if the knockdown of CACT inhibits β -oxidation and if the miRNAs directly affect CACT expression, tested by using radioactively labeled in-vivo β -oxidation and a luciferase assay using a reporter gene, respectively. Results of this study will help the understanding of insulin secretion regulation and lead to advances in cures for diabetes.

STANDARD GROWTH CURVE OF HCMV LACKING MIR-US5-2 WILL EXPLORE THE REASONS FOR DOWN REGULATION OF US7

Drew Gunderson, Rebecca Tirabassi (Mentor), Medical Microbiology

Human Cytomegalovirus (HCMV) is a strain of herpes virus that affects 50-80 percent of people and can be fatal in immunosuppressed individuals. HCMV expresses microRNAs that are used to inhibit the expression of host and viral genes. miR-US5-1 and miR-US5-2, inhibit the expression of its own genes, US7, for unknown reasons. The function of US7 is unknown. To determine the role of US7 and its regulation by microRNAs, recombinant viruses expressing tagged US7 with and without miR-US5-2 are being characterized. A growth curve that charts the virus' growth over ten days was created of the wild type strain. This will be compared to a growth curve of a virus lacking miR-US5-2 to determine if high expression of US7 is detrimental to growth of the virus.

MOTHER'S SCHOOL IDENTITIES AND CHILDREN'S ACADEMIC READINESS

Elizabeth Halama, Courtney Belawich, Rebeka Lemahieu, Kyle Miller, Thomas Murphy, Kristin Orlowski, Janean Dilworth-Bart (Mentor), Human Development & Family Studies

The study examines the relationship between mothers' school identities, their academic socialization behaviors, and their child's subsequent school readiness independent of socioeconomic status. Mothers participated in a semi-structured school experiences interview and completed a self-report of their academic socialization behaviors. Home environment was assessed using the Home Observation of Measure of the Early Environment (HOME). Children were administered academic readiness tasks at home and were given math and literacy assessments in the lab. Our analysis provided evidence that mothers with positive school-related identities and experiences had provided a greater number of books in the home and higher quality home environments. Children of mothers with positive school identities scored higher in math, but there was no group difference in literacy scores after socioeconomic factors were controlled.

MICROFLUIDIC CHARACTERIZATION OF POLYETHYLENE GLYCOL DIFFUSIVITY

Andrew Hanske, Thomas Keenan (Mentor), Biomedical Engineering

Polyethylene glycol(PEG) is a widely used hydrogel in biomaterial research and product development due to its limited interaction with cells and good biocompatibility. Many of its applications rely heavily on its diffusive properties. This study compares the diffusive properties of PEG diacrylates to the relatively novel PEG Norbornene hydrogels, at a range of molecular weights and weight percentages. Diffusivity was determined by polymerizing the PEG hydrogels in microfluidic devices and observing the gradient generation of different molecular weight fluorescent molecules. MATLAB was then used to compare these gradient profiles to theoretical diffusivity curves and determine the diffusive properties of the gels. Changes in weight percent proved to be the most significant factor in the alteration of diffusive properties.

INTERPRETATION OF EFFECTS OF HYDROXYLATED COMPOUNDS ON DNA HAIRPIN STABILITY

Zeeshan Haq, Douglas Knowles (Mentor), Biochemistry

The characterization of the interactions between hydroxylated solutes and biological macromolecules is an important endeavor that will aid in the development of solutes as tools in a number of biochemical contexts including protein stabilization and crystallization. Little information is known regarding these non-covalent interactions, thus, this study used solubility analysis to quantify the interactions between the surfaces on hydroxylated solutes and purine/pyrimidine derivatives. Subsequently, we utilized DNA melting studies to quantify the effects of the solutes on the overall stability of DNA hairpins. Interpretation of this data using the solute partitioning model allowed for the identification of these specific interactions and the development of the ability to predict the effect of any hydroxylated solute on DNA stability. Glycerol has been found to have a favorable preferential interaction with the sp2N, sp3N, and sp3C of DNA bases/analogs and an unfavorable preferential interaction with sp2O. The effect of various poly-hydroxylated solutes on 12nt and 16nt DNA hairpin stability has also been quantified, and the data demonstrates a positive correlation between solute surface area and the destabilization of DNA.

SNOWMOBILING: CLIMATE CHANGE IMPACTS AND ADAPTATION STRATEGIES

Catherine Harris, Adena Rissman (Mentor), Forest & Wildlife Ecology

Snowmobiling provides an important recreational opportunity as well as economic support for tourism dependent communities. This study examines the impacts of climate change on recreational snowmobiling in Wisconsin and how snowmobilers may be adapting to unreliable and changing winter conditions. Preliminary results based on historical trail records show high variability between years, but little evidence of trend over time due to limited data availability. Interviews with county officials, riders, and club representatives from 9 counties reveal multiple adaptation strategies to manage unpredictable winters. Adaptation strategies by snowmobilers vary across the state and include, changes of trail management, design, and changes in where and how people recreate.

FIRST GENERATION SUCCESSION PLANNING FOR FAMILY BUSINESS

Steve Hegedus, Debra Holschuh-Houden (Mentor), Business Outreach

The purpose of this research is to identify issues associated with first generation business succession and to establish best practices for coparcenary succession plans. The information acquired will be used to develop a succession plan for my family's company. The first phase of the project involves extensive literary research on best practices of succession planning. Interviews with professionals in the area of succession planning as well as company owners who have successfully planned for succession will be included in the research. After research is complete, I will work with my family's business and develop a succession plan for the company.

This succession plan will be greatly influential in providing a foundation for the actual succession plan for the future of a multi-million dollar company.

SIMULATION OF ELECTRON BERNSTEIN WAVE CURRENT DRIVE IN THE MADISON SYMMETRIC TORUS

Eric Hendries, Jay Anderson (Mentor), Physics

One of the major challenges to magnetically confined plasma fusion devices is maintaining a stable state within the plasma. Radio frequency current drive is a method proposed to aid in this crucial function of stability. We study this method through simulations of the injected waves, the resulting current drive, and effects on magnetic fluctuations within the plasma. In order to understand important factors for efficient current drive, we vary multiple parameters at each level of simulation. We further make predictions for experimental measurables so that theory and experiment can be compared. The results of this modeling will guide current experimental efforts to produce this current drive in the laboratory.

IMMIGRANT FAMILIES: LITERACY AND IDENTITY DEVELOPMENT OVER TIME AND SPACE

Sou Her, Jieun Kim, Catherine Lilly (Mentor), Curriculum and Instruction

Begun in fall 2008, this research project is to span a total of approximately ten years and follows fifteen immigrant children from first grade through high school. The project is a qualitative longitudinal study in which data is obtained through observation of children at home and school, parent and student interviews, student or researcher-created artifacts, and conversations about the artifacts. The main purpose of the project is to observe and generate results that allow educators to 1) challenge negative assumptions about immigrant families; 2) understand and build upon the rich experiences that immigrant children bring to classrooms; and 3) design instructional programs and policies that recognize the unique, complex temporal and spatial contexts that immigrant families bring to schools and communities.

INVESTIGATION OF A-OLEFIN PRODUCTION IN SYNECHOCOCCUS SP. STRAIN PCC 7002

Nicolaus Herman, Brian Pflieger (Mentor), Chemical and Biological Engineering

Factors influencing the unique hydrocarbon production of the cyanobacterium *Synechococcus* sp. strain PCC 7002 were investigated. The production of these compounds, 1-nonadecene (C19:1) and 1,14-nonadecadiene (C19:2), was studied under different physiological conditions to suggest means to maximize this production. Additionally, genetic engineering methods were applied to attempt to increase this production by incorporating genes encoding acetyl-CoA carboxylase (ACC) from other cyanobacterium strains. ACC is used to produce malonyl-CoA, a known substrate for the hydrocarbons of interest. By overproducing ACC in PCC 7002, it is possible that hydrocarbon production will increase. These hydrocarbons are of significance given their

potential use as biologically-derived fuels. This mode of fuel production would benefit over current fossil-fuel based energy given the renewable nature of this pathway, and the compatibility of these hydrocarbons with current fuel distribution and storage infrastructures.

EFFECTS OF LIMB EXERCISE ON CRANIAL SENSORIMOTOR MOTOR DEFICITS IN A RAT MODEL OF PARKINSON DISEASE

Breanna Hilby, Michelle Ciucci (Mentor), Communicative Disorders

Parkinson Disease (PD) is a progressive neurological disorder caused by degeneration of nigrostriatal dopamine neurons that manifests as limb and cranial sensorimotor dysfunction. In rat models of PD (neurotoxin infusion to the nigrostriatal pathways), research has shown that skilled forelimb exercise improves behavior (forelimb use) and rescues dopamine levels in the brain. Interestingly, we have found that vocalization is also impaired in this model and vocalization exercise improves behavior, but without a dopamine rescue. As such, we tested the hypothesis that a skilled forelimb exercise in the rat model would rescue dopamine neurons, but not improve vocalization, as this aspect of sensorimotor control is likely related to extra-striatal mechanisms. Results will be presented for behavior and acoustic measures and implications will be discussed.

INHIBITION OF NHE-1 AFTER OGD IN HIPPOCAMPAL ASTROCYTES DECREASES CYTOKINE RELEASE

Benjamin Hiller, Pelin Cengiz (Mentor), Pediatrics

Hypoxia ischemia (HI) is a common cause of brain injury in neonates. One hallmark characteristic of HI is the development of reactive astrogliosis in the hippocampus. One characteristic of reactive astrogliosis is release of pro-inflammatory cytokines. However, the impact of reactive astrogliosis and cytokine release in the hippocampus after HI is unknown. In this study, we investigated the role of the Na⁺/H⁺ exchanger isoform 1 (NHE-1) protein in hippocampal reactive astrocyte function using an in vitro ischemia model (consisting of oxygen/glucose deprivation and reoxygenation, OGD/REOX). REOX triggered the release of pro-inflammatory cytokines IL-6, TNF- α , and IL-1 β from hippocampal astrocytes. Inhibition of NHE-1 activity with its potent inhibitor HOE 642 significantly reduced pro-inflammatory cytokine release in hippocampal astrocytes under both normoxic and ischemic conditions. These results suggest that NHE-1 plays a critical neuroprotective role via reducing pro-inflammatory cytokine release.

INSIDE THE MOMENT: EXPLORING THE POTENTIALS OF EVOCATIVE ABSTRACTION

Henry Holmes, Li Chiao-Ping (Mentor), Dance

Composition inherently confers some level of abstraction, which exists as a signpost between a work's generative seeds of inspiration and the resultant form it assumes. The prevailing objective of abstraction, being to extract the nuanced from the normative, holds a principal position in the context of art making. Even so, its intellectual nature can obscure evocative intentions. Through a piece constructed of fractured meaning and intangible contexts, this relationship is explored from an experiential perspective. What emerge are insights into the nature of experience as it imprints the self, the capacities of abstraction to access and interpret those impressions, and the efficacy of a moment's temporal repose. These understandings reveal valuable avenues of expression and reflection, and suggest the importance of abstraction's delicate emotional syntheses.

COLOCALIZATION OF LEPTIN RECEPTORS IN GABA NEURONS IN MACACA MULATTA

Samantha Holten, Ei Terasawa-Grilley (Mentor), Pediatrics

Recent studies indicate that high-calorie intake causes precocious puberty. To investigate the mechanism by which a high calorie diet induces early puberty, the potential colocalization of leptin receptors in GABA neurons was investigated. Hypothalamic sections from Rhesus monkeys (*Macaca mulatta*) were obtained and immunocytochemically stained. GABA neurons and leptin receptors (LEPR) were respectively identified by VGAT and LEPR antibody immunoreactivities. Antigen and antibody reactions were visualized with DAB. First, each staining conducted independently and distribution pattern of both staining were analyzed. The results show that there were overlap regions of VGAT and LEPR immunostained neurons in the hypothalamus. Double immunofluorescent staining will confirm the colocalization. If confirmed, the link between elevated leptin due to high calorie and precocious puberty through GABA neurons.

RELATIONSHIP BETWEEN MOTHERS' GRANTING OF AUTONOMY, ADOLESCENTS' SELF-EFFICACY AND MATH ACHIEVEMENT

Molly Hottman, Janet Hyde (Mentor), Psychology

The goal of the research was to determine if mothers' encouragement of adolescent autonomy predicts self-efficacy in math, and if these factors predict academic achievement in math. Previous research has shown that encouragement of autonomy predicts self-efficacy, and self-efficacy predicts academic success, but the 3 factors have not been studied together. 400 mothers and their adolescents participated in a longitudinal study. Math self-efficacy was measured via questionnaires at age 15; videos of mother-child interactions while doing math problems at age 13 were used to assess encouragement of autonomy. The adolescents' school transcripts were used to assess math achievement. The prediction was that adolescents whose mothers encourage

autonomy will score high in self-efficacy, which will predict academic success. Partial support was found for this hypothesis.

AGATES

Sigrid Hubertz, Elaine Scheer (Mentor), Art

I began painting agate rocks after I completed a series of map drawings. The maps I produced were literal depictions of places that surrounded bodies of water. The style I developed within the lakes contained delicate, flowing lines, which ultimately inspired me to shift gears. These lines on the maps transformed themselves into the striations of colorful agate rocks. My rock paintings emphasize the vast array of colors and patterns that form the substance of geodes. I find comfort through painting these lines, all while paying tribute to nature's small, yet indestructable beauties.

FUNCTION OF A NEMATODE INTESTINE LOCALIZATION PROTEIN IN NEMATODE COLONIZING XENORHABDUS NEMATOPHILA

Seong-In Hyun, Heidi Goodrich-Blair (Mentor), Bacteriology

The bacterium *Xenorhabdus nematophila* forms a mutualistic relationship with a nematode *Steinernema carpocapsae*. This association is species specific; *S. carpocapsae* can only be colonized by *X. nematophila*, not other *Xenorhabdus* species. A protein called NilB is essential for *X. nematophila* to colonize nematode epithelial cells. NilB function is as yet unknown, but several experiments have raised the possibility that it functions as a metal transporter, with an increase in its expression being observed upon addition of manganese. Furthermore, preliminary data suggest NilB confers resistance to manganese toxicity. Identification of nematode factors that interact with NilB using cross-linking and co-precipitation is in progress.

THE ISOLATION, IDENTIFICATION, AND CHARACTERIZATION OF WILD YEASTS

Brielle James, Christopher Hittinger (Mentor), Genetics

In addition to being used in bakeries and breweries, yeast is also being used in the biofuel industry and is hoped to one day serve as a replacement for fossil fuels. To study the biodiversity, ecology, and evolution of yeasts, samples were isolated by systematically diluting them into various media for ideal growth. By comparing their list of base pairs to known DNA sequences in a nucleotide database, each sample was then identified by species. Species characterization was tested across various temperature and carbon source conditions. This characterization of the various species will contribute to the knowledge base of yeasts and their possible uses. As I learn about their carbon metabolism, yeast species can be better engineered to meet the world energy needs.

THE REEMERGENCE OF RACIAL INEQUALITY IN CONTEMPORARY CUBA

Lachelle Jennings, Mara Loveman (Mentor), Sociology

My research explores the effects of recent market-oriented reforms on racial inequality in Cuba. While racial stratification is a common worldwide phenomenon, progressive reforms in Cuba during the early 1960s virtually eliminated racial inequality in health, education, and occupational attainment. Shifts in social and economic policy beginning in the 1990s, however, initiated the gradual erosion of Cuba's progress on this front. Once again, racial inequality is on the rise in Cuban society. My research project has three primary objectives: (1) to synthesize the current state of knowledge about racial inequality in contemporary Cuba; (2) to analyze the primary social and economic factors fueling the growth of racial inequality; and (3) to identify specific policy interventions that could mitigate increasing racial inequality as economic liberalization proceeds.

STUDY OF STRUCTURAL CONNECTIVITY IN CHILDREN WITH NEW-ONSET EPILEPSY

Brian Ji, David Hsu (Mentor), Neurology

Diffusion tensor imaging (DTI) is a non-invasive magnetic resonance imaging technique that has been critical to understanding neurological disorders affecting cerebral white matter and childhood epilepsy in particular. Fractional anisotropy (FA) has long been used as a voxel-wise biomarker for abnormal white matter development in epilepsy, with patient voxels exhibiting reduced anisotropy in certain white matter structures. Here we describe a new method for generating connectivity maps that builds on FA maps by incorporating nearest and next-nearest neighbor structural connectivity measures. We demonstrate the sensitivity of these connectivity maps in detecting white matter structural abnormalities in new-onset childhood epilepsy and give the earliest indications of their clinical utility.

"WE SEE WHAT YOU'RE SAYING": THE VETERAN PRINT PROJECT

Patrick Johnson, Max Puchalsky, Gail Simpson (Mentor), Art

In Wisconsin, veterans experience two related, critical conflicts: the difficulty of sharing their stories from war and the challenge of performing an assimilated role in a culture despite their stories going untold. As a result, many veterans do not take advantage of the benefits that the state has to offer. The Veteran Print Project asks veterans to reconsider their relationships to the public by encouraging them to tell their stories. Artists then take these conversations and turn them into fine art prints. By exhibiting these prints and visualizing for veterans the experiences that they have trouble communicating, productive dialogue happens across unexpected borders. At the intersection of art and politics, we notice something starting to flourish, something new and productive for veterans and civilians alike.

IDENTIFICATION OF SMALL MOLECULE INHIBITORS OF FIBRONECTIN MATRIX ASSEMBLY

Ian Johnson, Bianca Tomasini-Johansson (Mentor), Biomolecular Chemistry

Fibronectin (FN) is an essential component of the extracellular matrix. FN influences thrombus formation, and may also participate in fibrotic disease and cancer. We developed a fluorescence-based FN assembly assay that was adapted to high-throughput screening and implemented at the Small Molecule Screening Facility on campus. Screening of libraries composed of 4160 known bioactive compounds identified 10 potential inhibitors of assembly. We determined the dose-dependency of inhibition of these compounds in the fluorescence-based assay. Highly effective inhibitors (IC₅₀ 15-40 μ M) with low cytotoxicity were further evaluated by fluorescence microscopy to assess FN matrix assembly and effects on actin stress fiber formation. We identified 3 inhibitors that will be tested in murine models of mammary carcinoma promoted by collagen density.

THE DYNAMICS OF PHILANTHROPIC FAMILY FOUNDATIONS WITHIN FAMILY BUSINESSES

Jayne Jones, Debra Holschuh-Houden (Mentor), Business Outreach

My research aims to determine how family businesses and their respective family foundations are mutually beneficial to one another. I also seek to discover the various motivations behind starting a philanthropic venture from an already existing business and how issues found within family businesses translate into problems that arise when starting foundations. I will conduct my research utilizing articles from peer-reviewed journals and through profiling family foundations in the Madison area. I expect most family businesses and family foundations to benefit each other regarding financial planning and retaining specific family values. I predict that several of the issues that face family businesses are reflected in their philanthropic ventures, and that these issues are multiplied when taking on both a business and a foundation.

THE ROLE OF LIPASES IN ASPERGILLUS FLAVUS

Rachel Jones, Katharyn Schmitt (Mentor), Microbiology

Aspergillus flavus is a fungus that grows on oil-rich seed crops. It manufactures a carcinogen called aflatoxin. Lipases are enzymes that cleave fatty acids from triglycerides. I am interested in the roles of *A. flavus* lipases in pathogenicity. I examined the effects of deleting six lipases, lipA-F, in the fungus. I grew the lipase mutants on media containing the triglyceride tributyrin to test lipase activity. After three days, mutants lacking lipA, B, D, or F metabolized more tributyrin than the wild type. This may be due to feedback between the lipases, resulting in an increase in lipase activity. After seven days, however, there were no differences in activity between strains. Current studies are investigating the role of these lipases in pathogenicity on corn and peanuts.

CHILDREN WITH CHRONIC CONDITIONS: PARENT PERCEPTIONS OF SCHOOL HEALTH SERVICES

Andrea Jordan, Lori Anderson (Mentor), Nursing

School-based care is an important component of health care for Hispanic children with chronic conditions and their families. Communication issues in general have consistently been identified as problematic between health care professionals and Hispanic patients. Language barriers and health care staff lack of knowledge about cultural issues have been associated with lower satisfaction with health care. A survey was mailed to 543 Wisconsin families of children with chronic conditions regarding the health care their children receive at school. Data were analyzed to examine the relationship between parent Hispanic ethnicity and parent perception of the adequacy of communication with the school and parent satisfaction with school health services. It was hypothesized that Hispanic parents will rate adequacy of communication and satisfaction level lower than non-Hispanic parents.

CHEMICALLY MODIFYING WOOD FLOUR TO INCREASE DURABILITY FOR WOOD PLASTIC COMPOSITES

Angeline Juan, Lucas Moyer Horner (Mentor), Institute for Biology Education

Wood-plastic composites (WPC) are expected to be more durable than untreated wood yet some have been found to fungally degrade. Since arsenic and chromium can be toxic, alternative wood treatments are needed. Preliminary studies indicate organosilicates effectively bond with wood cell walls. To test the biological efficacy of organosilicates, wood-flour was treated with two different concentrations and then injection molded into WPC specimens. Specimens were preconditioned with water and then exposed to a white-rot, brown-rot, or no fungus for twelve weeks. Weight loss and moisture content calculations will determine the treatment's durability. We expect that organosilicate solutions will inhibit wood fungal deterioration. Based on these results, we can test the treatment's durability on other outdoor elements and modify these treatments for natural wood.

THE INFLUENCE OF FACEBOOK ON ALCOHOL CONSUMPTION OF COLLEGE FRESHMEN

Lauren Kacvinsky, Megan Moreno (Mentor), Pediatrics

Recent data has shown that 45% of U.S. college students report having engaged in binge drinking (defined as five or more drinks in one sitting for men and four or more drinks in one sitting for women) at least once in a two week period. Risks associated with binge drinking include injuries and health problems. College students often display references to alcohol use on Facebook, a popular social networking site used by most college students. It's possible that seeing these references to drinking may influence the students' Facebook friends to engage in alcohol use. Freshmen college students were interviewed and asked what influence Facebook has played in their decision to drink alcohol. Categories were created from their responses and analysis will be completed by URS.

LAND CODE USE

Joseph Kahl, Nancy Wiegand (Mentor), Space Science & Engineering Center

The basis of this project is to write software that makes it easier to search for Wisconsin land use codes. In Wisconsin, land use codes are problematic, due to the fact that they are different for each county in the state. Because of this, searching the entire state for specific types of land is difficult. This project began by compiling a detailed list of all land codes in each county, and noting the special relationships between them. The software employs a tree-like data structure that efficiently searches through the nodes to complete queries.

INTRATUMORAL HU14.18-IL2 INDUCES ENHANCED ANTITUMOR EFFECTS INVOLVING ACTIVATED T- AND NK-CELLS

Nicholas Kalogriopoulos, Paul Sondel (Mentor), Pediatrics

Hu14.18-IL2 is an immunocytokine (IC) consisting of human IL-2 linked to the hu14.18 mAb that recognizes the GD2 disialoganglioside on neuroblastoma and melanoma, cancers for which it is administered intravenously in clinical trials. We compared the antitumor effects of intratumoral IC (IT-IC) and intravenous IC (IV-IC). Improved survival and inhibition of tumor growth are observed with IT-IC compared to IV-IC. The antitumor effects of IT-IC were inhibited by depletion of NK cells or T cells, suggesting a role for these immune cells. IT-IC results in increased NKG2D effector receptors on intratumoral NK and CD8+ T cells compared to IV-IC. Prolonged retention of IC at the tumor site is seen with IT-IC compared to IV-IC. These data support clinical testing of IT-IC.

A COMPARATIVE STUDY OF FC GAMMA RECEPTORS IN HOMO SAPIENS, HOMO NEANDERTHALENSIS, AND THE DENISOVA

Nicole Kalupa, Aaron Sams (Mentor), Anthropology

Neanderthals and the Denisova were two sub-species of humans that existed in the late Pleistocene. A comparison of these species genetic information with modern humans can provide insight into the evolution of the immune system and differences between ancient immune systems. The research focuses on type II and III Fc gamma receptors which are responsible for respiratory burst, phagocytosis, and are components of natural killer cells. Utilizing information provided from DNA extractions of Neanderthal and Denisovan fossils, differences at single nucleotide polymorphism sites in the FCGR2A, FCGR2B, FCGR3A, and FCGR3B were ascertained. A nonsense mutation in chr1: 159742829 and missense mutations in chr1: 159784957 and chr1:159784984 were found, yielding the conclusion that immune system differences may have contributed to the demise of Neanderthals and Denisova.

EFFECT OF CLIMATE CHANGE ON TANNIN LEVELS IN ASPEN AND BIRCH

Yamini Karandikar, Ezra Schwartzberg (Mentor), Entomology

To test the effects of climate warming on tree defensive chemistry, we measured condensed tannin levels in aspen and birch plant leaves. Tannins are used as a defense mechanism by plants to protect from herbivory. The Growth Differentiation Balance Hypothesis states that as plants gain the ability to grow faster, less energy is allocated towards defense. Under warmer growing conditions, such as those experienced under predicted future temperatures, we expect plants to grow faster and produce less condensed tannins. To test this, leaf samples from aspen and birch trees grown under control, +1.8, and +3.6 C temperature-controlled forest plots were analyzed for tannin content. We found that birch and aspen grown under higher temperatures have lower levels of condensed tannin.

COAST REDWOOD (SEQUOIA SEMPERVIRENS) AND ITS POLYPLOID ORIGIN

Robel Kebede, Allison Scott (Mentor), Botany

Coast redwood (*Sequoia sempervirens*) is one of the tallest and longest living trees in the world. Restricted to the coasts of California and Oregon, the coast redwood is the only conifer that is hexaploid (has six copies of each chromosome). However, the origin of its polyploidy is unknown. *S. sempervirens* is in the Cupressaceae and is most closely related to the diploids giant sequoia (*Sequoiadendron giganteum*) and dawn redwood (*Metasequoia glyptostroboides*). *Alerce* (*Fitzroya cupressoides*), a tetraploid in the family Cupressaceae, shares morphological similarities with the redwoods. In this study we will amplify low-copy nuclear genes in all four species. By analyzing the sequence of these genes and estimating their phylogenetic history we can gain a better understanding of the origin of polyploidy in coast redwood.

STUDYING SCIENCE IN THE STUDIO: THE INTEGRATION OF KNOWLEDGE THROUGH DANCE COMPOSITION

Rebecca Kesting, Katherine Corby (Mentor), Dance

In my most recent choreographic project, I began by researching the HIV virus as a source of inspiration. Serendipitously, this project coincided with my enrollment in Microbiology 101/102, thus expanding my knowledge base. I used my understanding of the interactions between molecules and microorganisms to inform the movement vocabulary I created, the relationships established between dancers, the improvisation and composition structures posed to the dancers, and the progression of the work. As I develop this piece, now titled *Inoculate*, I continue to find connections to scientific theory. In my presentation I will discuss my choreographic process, show an excerpt from *Inoculate*, and then open to discussion.

LARYNGEAL SOMATOSENSORY DEFICITS IN AGING

Qateeb Khan, Michael Hammer (Mentor), Surgery

Aging of the human airway is associated with a wide variety of symptoms, including laryngeal aspiration of food. This study hypothesizes that this aspiration is due to the degeneration of laryngeal sensory receptors, causing the larynx to lose its somatosensory ability. Reduced somatosensory function may decrease the ability of the larynx to detect and protect the airway from food particles being aspirated into the lungs. Currently, a protocol is being established in order to detect the degeneration of sensory receptors within the larynx. To establish such a protocol, rat larynges are harvested and different staining procedures are evaluated. Once this protocol is established, further studies will be conducted in order to examine the association of airway sensory deficits with airway motor changes in aging.

SUCCESSFULLY TRANSITIONING TO OUTSIDE MANAGEMENT IN A FAMILY BUSINESS

Meghan Khoury, Debra Holschuh-Houden (Mentor), Business Outreach

Management is a critical issue that must be carefully discussed during succession planning for a family business. Through a case study of the Smith family, we examine their successful transition to the outside, non-family management of Smith Foods Distribution Inc. The aspects of this case study explore the advantages and disadvantages of the progression to outside, non-family management in addition to issues that may arise during this transition and how those issues could be overcome. This study will focus on how a family is able to maintain ownership and continue to be the face of their company while trusting the managerial responsibilities to an outside party.

"BREAK"

Hyoin Kim, Marlene Skog (Mentor), Dance

Through this project "BREAK" I wanted to find different side of myself as both a choreographer and a dancer by exploring farther out from my comfort zone and by looking at dance from a broader perspective. The main theme of the project is to portray the struggle in present and future as well as the process of fighting through those struggles. For a method, I used two opposite dynamic qualities of movement that are explosive energy versus stillness. I found out about myself as a dancer that I like to move with direct focus and full of sharp, fierce energy. I learned that there are various ways to look at what dance is as well as unlimited methods to choreograph a dance piece.

DEVELOPING A THERMAL HYPERGELSIC INDEX OF NEUROPATHIC PAIN IN SPINAL CORD INJURED RATS

HungTae Kim, Taehee Kim, Kristen Obiakor, Steven Siegel, Jeanet Ugalde, Ruby Valadez, Gurwattan Miranpuri (Mentor), Neurological Surgery

Spinal cord injury induced neuropathic pain (SCINP) affects up to 75% of patients. This study was aimed at developing a pain index based on quantitative analysis of thermal hyperalgesic (TH) response assessment in SCINP rat model. 929 Sprague Dawley rats were tested for pain employing UGO Basile apparatus plantar test. For each rat baseline data a day before SCI and post SCI latency data in seconds on day 21, 28, 35 and 42 of injury were recorded. We have characterized the incidence of pain behavior in each cohort of animals, described the zone of hyperalgesia, quantified its severity, and observed changes that occur over time. This comparative pain index will allow a repeatable and reliable quantitative approach to measure and study SCINP development in rodents.

CANCER AWARENESS: AGENTS OF CHANGE

Kevin King, Gurwattan Miranpuri (Mentor), Neurological Surgery

Once known as the breadbasket of India, Punjab is now infamous for its high rates of cancer cases where rural access to treatment is very limited. A fundamental level of cancer knowledge is as important in controlling cancer as new methodologies to prevention, early diagnosis, and treatment. We conducted a two-month direct health education program designed to increase awareness on breast, cervical, lung and brain cancers to university students in the Punjab Agricultural University in Ludhiana and to primary school children in Giana Village. The program evaluated perceptions, apprehensions, and the willingness of the students to educate and encourage their parents to take part in screening programs, reaching the low-income labor class adults by educating their children.

YOUTH EMPOWERMENT AND COMMUNITY ORGANIZING

Sean Kirkby, Michael Abalos, Dehidanin Cuevas, Chloe Vanderweele, Brian Christens (Mentor), Interdisciplinary Studies

Our research focuses on what it means to be a youth leader in organizations advocating social change. So far, our team has conducted a literature review as well as developed an interview protocol for both focus groups and individual interviews. Upon approval from the Institutional Review Board, our team will begin interviewing the youth involved with these organizations. The interview questions cover four categories of youth empowerment: relational, behavioral, emotional, and cognitive. These categories will help us understand the complex ideologies of youth leaders as well their interactions with the community. By collecting data about youth empowerment, our team will be able to better understand what motivates youth development and what leads to successful futures for the children involved in these organizations.

STYLE SHUFFLER

Robert Klein, Phillip Kim (Mentor), Business

We're currently working on a fashion and clothing website called Style Shuffler, which, similar to the concept of the music website Pandora, will provide customers with suggestions on what to buy based on their styles. By researching similar websites and testing different business models we've been able to construct a website which different business and aesthetic features including revenue generation, customer appeal and multichannel presence. We've now begun working on designs and templates for certain pages and applications of our website. Since the site is still under operation we have no results. We predict that if we follow other top websites and use our creativity to design an effective operating model and image we should be able to launch and then run the site successfully.

HIGH SCHOOL TEACHER VALUE-ADDED MODELS: SPECIFICATION, PROPERTIES, AND POTENTIAL SOURCES OF BIAS

Raymond Kluender, Robert Meyer (Mentor), Wisconsin Center for Education Research

In the wake of evidence promoting teacher quality as the preeminent school input for student achievement, many education reforms have emphasized outcomes-based accountability which rely on value-added estimates of teacher effectiveness. While there is a wealth of literature on teacher value-added models for grades 3-8 (where standardized testing is required by No Child Left Behind), estimating similar models for high school grades is in its infancy. This paper specifies several high school value-added models, discussing the tradeoffs in emphasizing competing goals of student inclusion, stability, reliability, and predictive power, among others. It also investigates a "track treatment effect" bias posited by Jackson (2012) and other potential biases. Finally, it investigates the statistical characterizations of the results and their implications for policy implementation.

TWITTER: A VIABLE SOURCE FOR HEALTH AND NEWS INFORMATION?

Sara Klunk, Megan Moreno (Mentor), Pediatrics

By understanding how Twitter is used, we can determine if Twitter would be an effective informant on news and health information. 43 college students were surveyed about the health and news resources they follow on Twitter. Results showed that 53.5% followed news sources. Of these, almost 35% reported Twitter as their primary news source. About 21% followed health tweets. Of these, 11% reported it as their primary source for health information. Popular reasons to follow sources included being informed (25%), "real time" updates (15.6%), and the information was interesting (34.4%). Results show that while Twitter is being used as a news source, far fewer users follow health information. This information could help determine if Twitter could be used to effectively broadcast current health information.

ELECTROSTATIC INTERACTIONS BETWEEN NASCENT PROTEINS AND THE RIBOSOMAL SURFACE

Anders Knight, Brian Arnold, Silvia Cavagnero (Mentor), Chemistry

The early stages of protein folding in vivo, as nascent chains emerge from the ribosome, are particularly interesting, yet poorly understood. This study targets the Coulombic interactions between a ribosome-bound nascent protein and the ribosomal surface. We monitored the spatial confinement of the polypeptide N terminus as a result of systematic variations in the net charge of the nascent chain emerging from the ribosome. We used the intrinsically disordered PIR domain of Grb14. Successive positive-to-negative mutations (e.g. Lys to Glu) were made to PIR, and all the ribosome-associated PIR variants were analyzed via fluorescence lifetime and depolarization in the frequency domain. A highly spatially biased (order parameter 0.74-0.81) and a highly dynamic species (order parameter ca. 0) were detected for all ribosome-bound nascent PIRs. As the nascent chain's net negative charge increases, the equilibrium shifts toward the highly dynamic population. This study shows that Coulombic interactions significantly affect nascent protein dynamics. In addition, we studied the kinetics of full-length PIR release from the ribosome until its naturally occurring IDP conformation is reached. Multiexponential kinetics was observed, including an intriguing very slow (min timescale) kinetic phase whose origin is currently under investigation.

A COMPARISON OF TWO METHODS FOR ANALYZING RUNNING GAIT KINEMATICS

Keith Knurr, Bryan Heiderscheit (Mentor), Orthopedics and Rehabilitation

Three-dimensional motion analysis is the gold standard for assessing running gait, but it is expensive, time consuming, and requires skilled personnel. Two-dimensional video is used to efficiently analyze running mechanics in a clinical setting. The research goal is to determine the correlation between two-dimensional and three-dimensional analysis of running gait to better understand measurement capabilities for clinical analysis. First, two-dimensional and three-dimensional gait analyses were performed simultaneously. Next, a standard set of measurements were taken throughout the running gait using two-dimensional images and were compared to three-dimensional measurements. Finally, statistical analysis was performed to assess the strength of correlation. The results will give healthcare providers insight on measurement capabilities and limitations of two-dimensional analyses while simultaneously showing how it compares to three-dimensional running gait data.

IS DNA OPENING BY RNA POLYMERASE GENERALLY THE SLOW STEP IN FORMING INITIATION-COMPETENT COMPLEXES?

Mark Kraemer, M Thomas Record (Mentor), Chemistry

The regulatory processes governing transcription of DNA into mRNA are vital for understanding the central dogma of molecular biology. Yet after decades of research surprisingly little is known about how the start site region of DNA is opened and how the different open complexes initiate. This study is aimed at understanding this process using E.coli RNA polymerase (RNAP) and two phage promoters (T7A1 and λ Pr). Kinetic mechanisms of transcription initiation are being studied using nitrocellulose filter binding and chemical footprinting. Rates of DNA opening determined by permanganate footprinting are being compared with rates of conversions between kinetically significant intermediates. Current results indicate that DNA opening is the bottleneck step in transcription initiation with similar kinetics at both the λ Pr and T7A1 promoters, suggesting a universal mechanism for DNA opening.

DEFECT-FREE SINGLE-CRYSTALLINE SiGe NANOMEMBRANES

Robin Kraidich, Deborah Paskiewicz (Mentor), Material Science & Engineering

Silicon-Germanium (Si_{1-x}Ge_x) semiconductor alloys play a pivotal role in the strain engineering of multilayer thin films for microelectronic devices; however, high quality, single crystalline, bulk forms of SiGe do not exist. SiGe thin films can be epitaxially grown on Si substrates, but the lattice constant difference between the two materials results in a compressive strain in the SiGe. If grown thick enough, the strain in the SiGe relaxes via crystalline defects. These defects degrade the material quality of the SiGe and alter the electronic properties. I am going to demonstrate the fabrication of SiGe nanomembranes: fully elastically relaxed, smooth, single-crystalline sheets of SiGe alloy (< ~100nm thick). The purpose of this research is to develop an efficient method to lift off SiGe from bulk Si substrates while allowing elastic relaxation of the compressive strain in the thin SiGe layer. I will present my methodology, which involves depositing a wax support layer, etching the Si substrate, measuring the strain state of the SiGe layer, and transferring the elastically relaxed SiGe NM to new substrates.

CHILDREN'S DIALECT-BASED SOCIAL PREFERENCES AND STATUS INFERENCES

Renee Kramer, Kristin Shutts (Mentor), Psychology

Research suggests that children use visual categories (e.g., race, gender) to navigate their social world. The present study focuses on a distinction that has received less attention in the literature on social reasoning: the dialect that people speak. We explored young children's preferences and inferences based on Standard American English (SAE) and African American English (AAE). Children aged 5 to 8 saw photographs of novel people paired with SAE and AAE voice clips. We probed whether children use dialect to guide their social preferences and inferences about social status (e.g., occupation, competence). Results suggest that both SAE- and AAE- speaking

children tend to prefer SAE speakers and infer that SAE speakers are higher in social status. However, this pattern is more robust for SAE-speaking children.

IDENTIFICATION OF GENES THAT SUPPRESS THE TSA1 MUTATION IN LOW-ZINC GROWN YEAST CELLS

Michael Kubisiak, Colin Macdiarmid (Mentor), Nutritional Sciences

Zinc deficiency in humans leads to increased oxidative stress and DNA damage, which are potential risk factors for disease. In *Saccharomyces cerevisiae*, zinc deficiency also leads to increased levels reactive oxygen species (ROS). In response to oxidative stresses, *S. cerevisiae* express certain genes, most notably TSA1, which are controlled by the Zap1p and Yap1p transcription factors. Loss of function to the TSA1 gene leads to an observed growth defect in zinc-limiting growth conditions. When grown in low zinc conditions, yeast strains that advantageously mutate will survive and minimize the growth defect. Our objective was to identify the suppressor mutants that reverse the TSA1 mutant phenotype and allow haploid *S. cerevisiae* to grow in zinc deficient conditions.

WHAT ARE THE GENDER DIFFERENCES IN COLLEGE STUDENTS' INFLUENCES ON SEEKING STD SCREENING?

Alexander Lacey, Uba Backonja, Diane Lauver (Mentor), Nursing

Young adults acquire a disproportional percentage of STDs. Women's STD screening behavior may differ from men's. Guided by the Theory of Care-Seeking Behavior, we examined gender differences in young adults' influences on seeking STD screening. In a descriptive, cross-sectional design, we randomly sampled 18-25 year-old students from a Midwestern university. They were 216 women; 114 men. Participants completed online questionnaires about motivators for, and barriers to, STD screening. Compared to men, women were 35% more likely to be screened during annual exams and 30% more likely to seek screening to prevent infertility. Compared to women, men were 26% more likely to avoid screening because they were monogamous or asymptomatic. These findings can assist nurse researchers develop gender-specific interventions to increase STD screening in young adults.

DISTRIBUTION OF 5-HT_{2C} SEROTONIN RECEPTOR BY IMMUNOCYTOCHEMISTRY

Courtney Lamondin, Mark Brownfield (Mentor), Comparative Biosciences

The 5-HT_{2C} serotonin receptor is involved in sleep wake cycles, consciousness, feeding and psychiatric diseases such as anxiety and depression. 5-HT_{2C} receptor distribution has been studied via in situ-hybridization and receptor binding, however functional receptor mapping by agonist induced FOS and immunocytochemical studies are not complete. The present study aims to locate the distribution of receptor-responsive neurons by their expression of nuclear FOS. Light microscopic immunocytochemistry in conjunction with fluorescent labeling were used to

determine whether the location of 5-HT_{2C} responsive cells is consistent with its involvement in oxytocin, vasopressin and corticotropin releasing hormone (CRH) secretion. The study confirmed the location of 5-HT_{2C} within the cerebral cortex, hypothalamus and paraventricular nucleus. The agonist mediated the secretion of vasopressin, oxytocin and CRH within the paraventricular nucleus.

EVALUATING WATER LEVEL FLUCTUATIONS IN A SANDSTONE AQUIFER SYSTEM

Lauren Lande, Christopher Gellasch (Mentor), Geoscience

In recent years, human enteric virus particles, which likely originate in sewers, have been detected in multiple deep municipal wells in Madison, WI. In order to determine the impact of municipal well pumping from the deeper aquifer, time series data of water levels from multiple shallow wells was collected. The magnitude and duration of water level fluctuations were analyzed to look for relationships between responses in each well that could indicate a hydraulic connection between the shallower and deeper aquifers. Water level changes demonstrate a correlation with depth of the aquifer and distance from the municipal well. Understanding these relationships is important for determining how wastewater indicators may rapidly migrate into the deeper bedrock aquifer that supplies wells in Madison.

FOR WE ARE THE OWNERS OF THIS LAND, AND IT IS OURS: IROQUOIS WOMEN AND COLONIZATION

Aubrey Lauersdorf, John Hall (Mentor), History

This project examines the means through which Iroquois women were active participants in Iroquois-European relations from the seventeenth through the early nineteenth century. It presents these women as asserting themselves in the political and social sphere, collectively working to safeguard the continuation of their people through both the preservation of traditional authority and a willingness to adapt. This project builds on recent scholarship that has emphasized the persistence of Native culture through this era of wrenching change. However, in this scholarship the role of Iroquois women remains overshadowed by the effect European contact had on interactions in which men were foregrounded, and this project seeks to reexamine cultural persistence through the lens of Native female agency.

DEMONSTRATION OF NUCLEAR PLASMA CONFINEMENT TECHNIQUES: CRUSHING RED BULL CANS

Blaine Law, Julien Sprott (Mentor), Physics

The purpose of this project is to illustrate the effects of the Lorentz force and its applicability to fusion research. The Lorentz force results when a current-carrying conductor is placed in a magnetic field. If two such conductors carry an electric current in the same direction, the Lorentz force acts to pull them toward each other. For our project, a capacitor provides a charge that flows

through three copper coils arranged in a cylindrical column. As the current travels through the coils a magnetic field is produced. The current then travels through three parallel copper posts surrounding a Red Bull can. Since the current is flowing through a magnetic field, the Lorentz force is applied and crushes the can.

HUMAN-COMPUTER INTERACTION

Kim Le, Jie Xu (Mentor), Industrial Engineering

The purpose for research is to understand the perception of a passive user towards an active user and technology being used. Past researchers found that passive users have been important in work systems involving multiple individuals interacting with technology. An experimental study using flight simulation is used allowing participant interaction with a computer system. Physiology measures, i.e. heart rate, palm sweating, and eye movement, are used for inferring participants' mental states. The research involves two studies - an individual active user study, and a team study involving one active and one passive user. Results will help identify different levels of trust in technology based on subjective reports and physiological data. This allows design changes in technology to effectively engage passive users in everyday use of technology.

STRUCTURE AND FUNCTION OF AN ENDOCYTIC ADAPTOR COMPLEX IN C.ELEGANS

Sun Haeng Lee, Anjon Audhya (Mentor), Biomolecular Chemistry

The goal of this project is to define the structure and composition of an intact clathrin adaptor complex and determine whether individual components of this complex can function in the absence of the other factors in vivo, using C.elegans as a model system. We have confirmed that two components of this complex, Eps15 and Intersectin interact with one another both in vivo and in vitro. Also, our study shows that this Eps15/Intersectin subcomplex is capable of binding to membranes in vitro. A triple mutant C.elegans strain that lacks all three components of the clathrin adaptor complex exhibits distinct phenotypes in morphology, growth rate, and embryonic lethality as compared to either wild type or animals lacking both Eps15 and Intersectin.

IB SIB

Yer Lee, Jennifer Angus (Mentor), Design Studies

We were given a case study by the YMA Fashion Scholarship Fund that challenged us to create an online fashion business that addressed a need/niche that was not being met in the market today. After we designed the business we were asked to design a collection of garments for the business. The goal of my business was to introduce the Hmong culture into the fashion industry and to encourage interest in the culture. A lot of practices and beliefs have been lost because the younger generations are not interested in their own culture. I wanted to use this company as a way to bring the Hmong culture to their world through fashion. My designs were a contemporary twist on traditional attire. Another aspect of the business was maintaining traditional crafting practices.

As a part of my business I would invite a traditional silver smith craftsman to create a jewelry line that complimented my collection.

SPIRITUALITY PREDICTS QUALITY OF LIFE FOLLOWING HEMATOPOIETIC STEM CELL TRANSPLANTATION

Laura Leeson, Erin Costanzo (Mentor), Psychiatry

We investigated the influence of spirituality on quality of life among cancer patients recovering from hematopoietic stem cell transplantation (HSCT). Patients (N=238) completed measures of two dimensions of spirituality (religious faith and meaning/peace), depression, fatigue, and pain prior to transplant and 1, 3, and 6 months post-transplant. Results indicated that spirituality changed significantly from pre- to post-transplant ($F(3,519)=6.78, p<.001$), with participants showing declines 1 month post-transplant and returning to baseline by 6 months post-transplant. Hierarchical regression models indicated that greater spirituality pre-transplant predicted less depression ($\beta = -.198$), fatigue ($\beta = -.201$), and pain ($\beta = -.147$) at post-transplant assessments (all $p < .05$). Follow up analyses clarified that meaning/peace, but not religious faith, predicted better outcomes. Findings suggest that the capacity to find meaning and peace may enhance recovery following HSCT.

ROLE OF MICROGLIA ACTIVATION IN SPINAL CORD INJURY NEUROPATHIC PAIN

Erin Lehman, Youhi Ghose, Nayab Khan, Gurwattan Miranpuri (Mentor), Neurological Surgery

Microglia are the immune cells of the central nervous system and their activation is implicated in the development and maintenance of spinal cord injury neuropathic pain (SCINP). We propose administration of cannabinoid receptor 2 (CB2) agonist following SCI, will inhibit microglia activation and reduce development of SCINP in the rat model. To understand the molecular mechanism, the study will be aimed at i) determining the distribution of activated microglia in the spinal cord, thalamus, and PAG following SCI and NP development; ii) determining the expression of microglia released factors following SCI and development of NP; iii) examining whether pharmacological interventions of CB2 agonist inhibits the activation of microglia and attenuates NP development.

IMMIGRANT FAMILIES: LITERACY AND IDENTITY DEVELOPMENT OVER TIME AND SPACE (SOCIAL SCIENCES)

Cheyenne Lentz, Catherine Lilly (Mentor), Curriculum and Instruction

This research follows four children from immigrant families in grades one to three and investigates how children and the families adjust to the change in a new environment and the effects it has on the children's school performance. Over a ten year period the research will involve student/researcher created artifacts, periodical interviews, observations of home and school. Time and space are important aspects of this research in that they will be used as a means

to compare information gathered over the study. In order to study the experiences of the children, discourse analysis methods will be used. As a result, this research hopes to identify and understand what immigrant children experience and therefore implement educational programs specifically for these immigrant children.

ISOLATION OF THE PROMOTER OF A HORMONE PRODUCING GENE IN THE YELLOW FEVER MOSQUITO

Lauren Leopold, Que Lan (Mentor), Entomology

The purpose of this research is to isolate and clone the promoter region of the hormone producing gene in the Yellow Fever mosquito via polymerase chain reaction. The Yellow Fever mosquito is responsible for transmitting Dengue Fever, a virus that affects millions of people globally. We will be using different PCR techniques to isolate the gene promoter of interest. Once isolated, the gene will aid in the production of a more efficient pesticide that could help control or even eliminate the Yellow Fever mosquito as a vector of Dengue Fever. This would prevent the suffering and deaths of thousands of people worldwide.

A DEVELOPMENTAL ANALYSIS OF VOWEL ACOUSTICS IN INDIVIDUALS WITH DOWN SYNDROME

Katie Lester, Hourii Vorperian (Mentor), Waisman Center

Vowel acoustic space, the area bounded by corner vowels /i/, /ae/, /u/, and /a/, has been documented to reflect speech understandability such that the smaller the area, the less distinct the vowels. The purpose of this study is to examine developmental changes in the vowel acoustic space and speech understandability in typically developing (TD) individuals and individuals with Down syndrome (DS). Speech samples entailing word repetitions were collected from participants (40 DS, 79 TD). Three analyses (vowel planar area, formant centralization ratio, and F2 ratio for /i/ and /u/) were used to assess differences. Results show atypical vowel production by individuals with DS. Such differences may be of clinical significance, and likely to be due to both craniofacial anomalies as well as disrupted motor control.

BEST HISTOLOGICAL METHOD TO QUANTIFY POSTSTROKE ANGIOGENESIS

Waiyin Leung, Matthew Jensen (Mentor), Neurology

Stroke is a leading cause of disability, with few effective treatments to improve recovery. Most stroke patients experience some degree of spontaneous recovery, but these natural processes leading to recovery after acquired brain injury are unclear. The formation of new blood vessels in the peri-infarct tissue, termed angiogenesis, appears to be important in restoring adequate perfusion to these healing areas. However, many aspects of angiogenesis and its contribution to stroke recovery are ambiguous. Therefore, effective quantification of angiogenesis after ischemic stroke is of great importance to elucidate its role in the recovery and remodeling of brain tissue, which may lead to new insights for further development of neurorestorative therapies. We thereby

sought to review evidence for the most reliable histological methods to quantify post-stroke angiogenesis.

PHYLOGENETIC STUDY OF INTERACTION BETWEEN E. COLI TRANSCRIPTION FACTOR Crl AND SIGMA S OF RNAP

Hueylie Lin, Richard Gourse (Mentor), Bacteriology

Bacterial RNA polymerase (RNAP) containing the specificity factor sigma S (σ S) is important for transcription during certain stress situations or upon entering stationary phase. Crl is a transcription factor that positively regulates σ S-dependent transcription in *Escherichia*. Current research suggests that transcriptional regulation by Crl in *E. coli* involves facilitation of RNAP holoenzyme assembly, by means of interaction with domain 2 of σ S. My study tests whether putative Crl homologs in *Vibrio harveyi* and *Proteus mirabilis* complement Crl function in Δ crl *E. coli* and interact with *E. coli* σ S. The degree of complementation and interaction by *V. harveyi* and *P. mirabilis* Crl has provided information about specific residues in *E. coli* Crl that are responsible for Crl- σ S interaction.

STUDYING TRANSCRIPTION INITIATION PROCESS USING NOVEL FLUORESCENT TECHNIQUES

Emily Lingeman, M Thomas Record (Mentor), Chemistry

In transcription, RNA polymerase (RNAP) synthesizes RNA from a DNA template. During transcription initiation, RNAP binds to promoter DNA to carry out a series of major conformational changes including bending and wrapping of upstream DNA, insertion of downstream DNA in the active site cleft, opening of DNA using binding free energy, and assembly of a clamp/jaw to stabilize the open complex. To improve our understanding of RNAP and the regulation of transcription initiation, I use fluorescence techniques to study DNA wrapping and subsequent steps of transcription initiation, including nucleotide binding and dinucleotide synthesis. A goal of my research is to test how transcription factors affect DNA wrapping, thereby affecting the rate of initiation. These studies will allow us to better understand gene expression regulation.

THE MOLECULAR BASIS OF TRANS-GENERAL REGENERATION BY FOLATE

Jamie Lockwood, Brenna Tomczak, Bermans Iskandar (Mentor), Neurosurgery

Previous studies from our laboratory have revealed that folic acid, a methyl donor, induces axon regeneration in the injured adult rodent central nervous system, in part via methylation. Extended studies reveal that this effect is trans-generational, and its magnitude increases with each generation. We are currently studying the molecular mechanism by which the effects of folate are passed from the parental generation to the progeny. By using Western Blotting and Reverse Transcription Polymerase Chain Reaction, we will examine whether folate alters the expression pattern of DNA methyltransferases (enzymes responsible for DNA methylation) in progeny

during embryogenesis. This will provide insight on the epigenetic basis of folate-induced neuronal growth and healing in the untreated progeny of folate-treated parents.

OBSERVING DIFFERENCES BETWEEN HEALTHY AND CANCER CELL MIGRATION USING SYNTHETIC CELL ADHESION ARRAYS

Sam Loveland, William Murphy (Mentor), Biomedical Engineering

Cancer is a result of transformed cells that have undergone genetic alterations resulting in unregulated behavior, such as irregular and invasive cell migration. HT-1080s are a transformed cell line that is commonly used to study tumor cell migration. However, very few studies have made direct comparisons between HT-1080s and healthy human cells to clearly identify changes in cell migrations related to oncogenesis. Here, we used a highly controllable synthetic array in combination with time lapse microscopy to investigate differences in HT-1080 and human dermal fibroblast (hDF, a healthy primary cell) migration. Using this approach, we identify previously unrealized differences in hDF and HT-1080s attachment and migration to provide new insight into the mechanisms that govern cancer cell behavior.

FAMILY BUSINESS IN REALITY TELEVISION

Annie Luchsinger, Debra Holschuh-Houden (Mentor), Business Outreach

My project focuses on discovering how real reality television shows are in regards to family businesses. An in-depth content analysis of family businesses within the media along with interviewing a local family business will show that there are drastic differences between romanticized reality television and real life family businesses. Specific factors that will be analyzed within television episodes include: succession, family dynamics, business skills, strategy, integration of non-family members into the business, dedication, and time commitment. These business elements will then be incorporated into a survey to be completed by local family businesses that have no television relations. From there, I will make comparisons between reality TV versus real family businesses, showing that family business operations generally differ from their depiction in the media.

REMEMBERING THE CITY OF PRIAM: MEMORY AND APPROPRIATIONS OF BRONZE AGE REMAINS AT GRECO-ROMAN ILION

Geoffrey Ludvik, William Aylward (Mentor), Classics

The site of Troy in modern Turkey has played a prominent role in the imagination of Western civilization since before the time of Homer. This legendary city of the Bronze Age was later built-over by historical Greeks and Romans, who renamed the site Ilion. This project proposed to study how the inhabitants of Greco-Roman Ilion appropriated the pre-existing Bronze Age ruins on their city. Based on previous archaeological research, locations of appropriated architecture were photo-documented and hypotheses of their function were synthesized as part of the Sophomore Summer Apprenticeship under Dr. William Aylward. Through this architectural and

topographical study, the ways that Ilion "remembered" its legendary past, and how this memory was reflected in the cultural landscape of the city have been surmised.

HYPERTENSION IN OFFSPRING OF GESTATIONAL DIABETES AND SEX-SPECIFIC CHANGES IN KIDNEY MACULAE Densa

Rebecca Lundberg, Pamela Kling (Mentor), Pediatrics

ABSTRACT: Offspring of mothers suffering from diabetes during pregnancy (gestational diabetes mellitus - GDM) have a greater risk for adverse long-term conditions such as hypertension. Adult male offspring of diabetic mothers (ODM) rats exhibit higher blood pressure (BP) than female ODM or control. The maculae densa (MD) is a group of specialized distal tubule cells that sense and regulate salt and water balance; controlling BP. We hypothesized that signaling by MD promotes hypertension in male ODM and our objective is to investigate developmental alterations in MD histology and function. Kidney tissues from control and ODM rats will be collected and stained with an antibody specific to neuronal Nitric Oxide Synthase (nNOS), an enzyme in high concentrations in the MD. MD cells will be point counted and digital software will quantitate the stained area.

FINAL CONSONANT CLUSTER REDUCTION IN AFRICAN AMERICAN ENGLISH DIALECT

Elizabeth Machurick, Jan Edwards (Mentor), Communicative Disorders

Children from low-socioeconomic status (SES) families generally speak a non-standard dialect of English. Dialect mismatch between these non-standard dialects and the language of instruction (Standard American English or SAE) may be detrimental to success in school. This study focused on one phonological feature (final consonant cluster reduction) of one non-standard dialect, African American English. Final consonant clusters in English that end in stops undergo a variable, conditioned process of simplification (Guy, 1980). The question of interest was whether acoustic duration differed for words that were subject to final consonant cluster reduction (e.g. col for cold) verses homophones that were not subject to this phonological feature (e.g. coal). Single word productions of 100 African American children were included in the study. The relationship of acoustic durations to the comprehension of single words in SAE with and without final consonant clusters was also examined.

PILOT IRRIGATION SYSTEM FOR FOOD SECURITY AND COMMUNITY DEVELOPMENT IN SOUTHWESTERN KENYA

Keegan Mackin, Erol Gudul, Philip Thomas, Neil Doll (Mentor), Civil & Environmental Engineering

The community of Orongo, Kenya consists mostly of subsistence farmers that live on less than US\$1 per day. Small-scale irrigation has the potential to increase crop output from 100% to 400% (FAO), which will increase farmer income and employment. Nine farmers were chosen by the community to participate in a lend-lease pump irrigation system. A centrally located stream was chosen as a reliable source of water after a hydrological study of the watershed. The leasing of centrifugal and treadle pumps will offset maintenance costs, while providing funding for new pumps and system expansion. Through our design, the nine farmers will be able to increase crop yield and set the foundation necessary for a community wide irrigation system.

INFLUENCE OF INTERMEDIATE PHASE CHEMICAL STRUCTURE ON OPTICAL PROPERTIES OF CARBON QUANTUM DOTS

Keegan Mackin, Michael Arnold (Mentor), Materials Science & Engineering

Carbon Quantum Dots (CQDs) are highly efficient and non-toxic luminescent particles that exhibit tunable optical properties. CQDs show promise for high efficiency lighting and bioimaging applications. However, much is still unknown about these particles, including the photoluminescence mechanism. One widely used synthesis process of thermal degradation requires the reflux, or continuous boiling without solvent loss, of a non-luminescent intermediate carbon phase to produce photoluminescent CQDs. With X-Ray Diffraction, Fourier Transformation Infrared Spectroscopy, and Raman Spectroscopy, we can determine the structure, composition, and hybridization type of both the intermediate phase and CQDs. This information will allow us to determine the relationship between the intermediate carbon phase and the resulting CQDs, which can provide insight into the photoluminescence mechanism and structural characteristics required for photoluminescence.

PC-3 CELLS AS AN INDUCIBLE MODEL FOR CANCER METASTASIS TO SCREEN FOR PHARMACOLOGICAL TREATMENTS

Norma Magallanes, Craig Atwood (Mentor), Medicine

Activins are members of the transforming growth factor- β superfamily and are involved in cell proliferation and differentiation in numerous tissues. In addition, they play pathological roles in cancer metastasis. ActRII signaling has been demonstrated to govern both cell viability and cell adhesion, with the suppression of activin signaling resulting in the ADAM-15-dependent detachment and death of cancer cells. Development of a cancer cell line that can be induced to detach would provide a suitable cell model of metastasis as well as be a useful tool for identifying drugs from chemical libraries that inhibit cancer cell mobility and metastasis. Using lentivirus, this project aims to develop an inducible PC-3 cell line that detaches upon suppression of ActRII signaling.

CELL DEATH IN DOWN SYNDROME IPSCS

Chelsie Maguire, A Bhattacharyya (Mentor), Waisman Center

Down Syndrome (DS) cells have abnormal programmed cell death (apoptosis), heightened expression of apoptosis related genes and increased generation of reactive oxygen species, all of which could lead to increased cell death. We developed DS human induced pluripotent stem cells (iPSCs), found an increase in expression of oxidative stress related genes and tested whether DS iPSCs and iPSC-derived neurons have increased cell death. We used the terminal deoxynucleotidyl transferase dUTP nick end labeling (TUNEL) assay that detects and labels DNA fragments that occur during apoptosis to detect cell death. There was no observed difference in the percentage of cells undergoing cell death between our DS and control iPSC cells nor DS iPSC-derived neurons. Thus, our TUNEL demonstrate no increased cell death in DS cells.

HIV IN FEDERAL PRISONS: ANALYSIS OF CURRENT TESTING POLICIES AND IMPLICATIONS FOR FUTURE POLICIES

Carly Malave, Ryan Westergaard (Mentor), Medicine

The purpose of this research is to determine the HIV testing policies for various federal correctional institutions and use that information to improve testing policies. This is a topic of interest because the percentage of HIV-positive individuals is three times higher in prison systems than in the general population of the U.S. The first phase of the project was to send out a survey to each facility with questions regarding the specifics of their individual testing policies. After this data was collected, the responses were categorized by region. The responses were analyzed and converted into percentages of the entire data set. The final data was presented to the Bureau of Federal Prisons and will be used to implement a universal testing policy in the future.

ORANGUTAN DENSITY AND NESTING PREFERENCES IN CENTRAL KALIMANTAN, INDONESIAN BORNEO

Cynthia Malone, Karen Strier (Mentor), Anthropology

Without a reversal of the current extensive deforestation of Indonesia's rainforests, the extinction of wild orangutans has been predicted to occur by 2025. Conservation efforts have focused on measuring orangutan population densities and responses to change so that remaining habitat is adequately protected. Population densities are estimated using indirect surveys of orangutan nests. However, our knowledge of nests beyond density is limited. I conducted a six week study with the Orangutan Tropical Peatland Project of orangutan density and nesting preferences in two forests of differing degrees of disturbance in Central Kalimantan. Orangutan density in the fragmented forest was estimated to be almost twice that of the less disturbed. Analyses of orangutan nests revealed preferences for particular tree species and habitat quality components, warranting further research.

HEALTH OUTCOME IMAGINATION AND SELF CARE BEHAVIORS IN TEENS WITH TYPE 1 DIABETES

Laura Mannino, Chelsea Rentmeester, Patricia Brennan (Mentor), Nursing

Aim: Imagination, the capacity to envision future states, may positively influence self care behaviors among teens with type 1 diabetes. We aim to examine patterns of self-care behaviors and imagination among teens and determine whether they can imagine future health outcomes. **Method:** Guided by an interview and written questionnaire, we measured the teens' knowledge of type 1 diabetes, self-care behaviors, their perceptions of diabetes and their ability to imagine. **Result:** We recruited five teens for this exploratory study and will present charts and graphs depicting the relationship between scores on an imagination scale, capacity to imagine future health outcomes and adherence to self care behaviors. **Conclusion:** This project provides the groundwork for a novel approach to helping teens self manage diabetes.

MESH

Rachael Martin, Carolyn Kallenborn (Mentor), Textile and Apparel Design

It is the mission of MESH to provide health conscious women of all ages with the active sportswear that combines fashion and function, fulfilling their aesthetic wants and functional needs at a fair and compelling price. Our combination of fit, fashion, and function will help our customers feel inspired and confident, whether they are competing on the tennis court or relaxing with family and friends. MESH will be distributed exclusively via its own website. This site will serve as a community for likeminded women to share ideas, images, and inspirations for leading a healthy active lifestyle, in addition to being an e-commerce platform. MESH will elicit input and dialog from its consumers via social media, encouraging involvement in the evolution of design and brand.

INHIBITION OF STAT-1 SIGNALING AS A NOVEL THERAPEUTIC TARGET OF PEDIATRIC HEMATOLOGIC MALIGNANCIES

Michael Martinez, Erbay Salievski, Christian Capitini (Mentor), Pediatrics

Treatment of hematologic malignancies with chemotherapy or radiation results in long-term toxicities and immunosuppression. Signal transducer and activator of transcription-1 (STAT-1) is a transcription factor that plays a role in normal cytokine signaling pathways, but also in tumorigenesis. In this study, we aim to investigate the role of STAT-1 in leukemia/lymphoma progression by first quantifying the constitutive expression level of STAT-1 in leukemia/lymphoma human cell lines and from primary tumors from patients by RT-PCR and flow cytometry. Next, we propose to block STAT-1 signaling using multiple STAT-1 inhibitors, and will monitor anti-tumor effects in vitro and in vivo. We hypothesize that the inhibition of the STAT-1 pathway will result in diminished tumor growth or death. Our work will develop STAT-1 inhibitors to treat hematologic malignancies.

CONTROLLED LARGE-AREA MULTILAYER GRAPHENE GROWTH BY CVD ON NICKEL THIN FILMS AT AMBIENT PRESSURE

Amir Mashal, Michael Arnold (Mentor), Materials Science & Engineering

Improving our understanding of multilayered graphene growth via chemical vapor deposition (CVD) is necessary for optimizing these materials for future applications. Here, we characterize the synthesis of large-area multilayered graphene on e-beam evaporated 400 nm Ni thin films by chemical vapor deposition at atmospheric pressure. We used Ar:CH₄ (95:5) mixed together with an Ar:H₂ (95:5) forming gas as our precursor gases. We controlled the average thickness of our multilayer graphene films through systematic isolations of temperature and CH₄ concentration while maintaining an optimal cooling rate. The thickness and quality of our multilayered graphene films were characterized through optical absorption, optical microscopy, and scanning electron microscopy (SEM). The thickness of the multilayered graphene was studied as a function of temperature and CH₄ concentration. We showed that the average thickness of the multilayered graphene increases with higher concentrations of CH₄ as well as the uniformity of the multilayered graphene decreasing with increased temperatures. By varying these parameters, we are able to show that we can control the average number of layers from \approx 10-60 layers (\approx 3-20nm). These findings represent an important step towards the fabrication of practical, large-scale, high quality multilayered graphene.

ENHANCING A COMBINATORIAL METHOD FOR IDENTIFYING OXYGEN-EVOLVING CATALYSTS

Robert Masse, Shannon Stahl (Mentor), Chemistry

Solar energy is a potential alternative to fossil fuels, but its intermittent nature demands that it be coupled to storable fuel generation. Driving the electrolysis of water with solar energy to produce hydrogen is a prospective solution to this problem. The balanced reaction requires economically practical catalysts for O₂ production, but such catalysts do not yet exist. A method to screen metal oxides was developed, and has been used to find novel catalytic blends. A test electrode is arrayed with permutations of metal oxides. Under oxidizing conditions, more catalytic spots produce more oxygen. An oxygen-sensitive paint detects this O₂ production during electrolysis. Prototypes achieved low-throughput proof-of-concept. An enhanced cell was designed and built to screen larger arrays with a shorter cycle-time.

AN IPAD APPLICATION TO AID IN LANGUAGE ACQUISITION AND DEVELOPMENT

Michael Maynord, Jitrapon Tiachunpun, Xiaojin Zhu (Mentor), Computer Science

The purpose of this research is the creation of an ipad application which assists in language acquisition and development. Such an application is of immediate use to clinicians in the Waisman center studying human development and developmental disabilities. The application functions by interactively voicing aloud the actions of a user who drags images around on the screen. An example phrase is "the squirrel ran up the tree" which could result from dragging an

image of a squirrel onto an image of a tree. A key challenge is the automated creation of 'sensible' English phrases, which amounts to the creation of a concrete definition of the intuitive notion 'sensible'. Methods of data-mining and machine learning are used to create this definition.

OLD TECHNOLOGY

Caitlin McCaffrey, Jack Damer (Mentor), Art

This piece is one of six lithography prints in a series titled Old Technology (28"x12"). I am interested in themes surrounding nostalgia, specifically through natural processes of deterioration. We see modern technology continually moving forward, while disregarding old technologies that gradually disappear from our modern repertoire. Through physical acts of deterioration, this series explores the idea of nostalgia as a opposing force to technology.

NATURÆ

Kathleen McGovern, Jennifer Angus (Mentor), Design Studies

Naturæ is an online apparel business selling naturally dyed clothing. For thousands of years people all around the world have used natural materials from their environment to dye their clothing and other textiles. The company seeks to educate our customers about the clothing they are buying; what it is made of, where it comes from, and how it is made. Naturæ has an expertise in dresses and formal wear. All of the designs have a classic silhouette that look great on almost every body type. Naturæ fills a void in the market place because there are very few people in the fashion industry working with natural dyes. The purpose of Naturæ is to reintroduce natural dyes that have disappeared from the fashion world.

THE RELATIONSHIP OF ODONATA LARVAE AND AQUATIC MACROPHYTES IN LAKE WINGRA, MADISON, WI

Stephanie McIlquham, Robert Bohanan (Mentor), Institute for Biology Education

Dragonflies and damselflies (Odonata) are a class of insects that are important to ecosystems. Their larvae spend 1-5 years in bodies of water including lakes, ponds, streams and rivers. In these bodies of water, larvae are prey to many fish, including Bluegills. Both larvae and adult odonata are predators. I am studying odonata, especially their larval lifestyle in Lake Wingra, Madison, Wisconsin. I'm investigating the relationship between odonata larvae and aquatic vegetation around which they live. I hypothesize that there will be a positive relationship between specific aquatic macrophytes and specific odonata species, which would help to make a case in preserving various species of aquatic vegetation.

THE "BLACK BOX" OF BIAS

Charielle McMullan, Carol Isaac (Mentor), Center for Women's Health & Research

The American Association for the Advancement of Science (AAAS) ascertains that there is a need for "bias literacy" throughout STEMM (Science, Technology, Engineering, Mathematics and Medicine) to mitigate the lifelong reinforcement of unconscious gender bias. This observational study examines the cultural reinforcement of gender bias during an intervention of 45 STEMM departments at one Research University. Field notes recorded during the workshops included verbal and non-verbal responses that were coded into patterns of receptivity and resistance by gender. Using a feminist poststructural lens, results illustrated the circular nature of power between presenters and participants that both hinder and help promote the goal of gender equity within an academic environment.

INDUCTION OF DLD-1 COLON CANCER CELL DEATH BY CHRYSIN MAY BE MEDIATED VIA THE AHR PATHWAY

Bryant Megna, Gregory Kennedy (Mentor), Surgery

We have observed that the loss of aryl hydrocarbon receptor (AhR) activity in mice increases susceptibility to colorectal tumorigenesis. The aryl hydrocarbon receptor (AhR) is a ligand dependent transcription factor that has been implicated as a tumor suppressor in a number of human malignancies including breast and lung. The AhR is bound and activated by a wide array of environmental agents leading to hallmark downstream gene expression. One such naturally occurring agent is 5,7-dihydroxyflavone, or chrysin. In order to delineate the mechanism(s) through which chrysin exerts its effects in colorectal malignancies, a targeted study of in vitro aryl hydrocarbon receptor induction is proposed utilizing an array of possible mediators.

THE USE OF A BIOREACTOR AS A TEACHING TOOL

Abhishek Mehrotra, Eamon Bernardoni, Matthew Bollom, Hallie Kreitlow, Bradley Lindevig, Amit Nimunkar (Mentor), Biomedical Engineering

The purpose of this research is to use the bioreactor device as a teaching tool to simulate bones studies and stress analysis, as well as introduce biomedical engineering students to other engineering sub-disciplines. To accomplish this task we first developed hands-on labs that focused on teaching students the engineering skills necessary to succeed in BME. Then, we had students work on a design project that incorporated all the engineering skills they had learned earlier in the class. The design project, called the bioreactor, is made from polycarbonate and holds an alginate sample. The sample would be subjected to a physical load to measure the strain induced and determine the failure point. Through this class, we hope students will be better prepared for biomedical engineering and future internships and co-ops.

INDUCTION OF APOPTOSIS AND NECROSIS IN NEUROBLASTOMA

Bryan Menapace, Dana Baiu (Mentor), Pediatrics

Neuroblastoma is one of the most common extracranial pediatric solid tumors. Afflicted patients that are high risk have long-term survivability of only 10%-20%. To improve this prognosis, we tested an alkyl-phospholipid, NM404, for anti-tumoral activity. NM404 is an inhibitor of Protein Kinase B and has been shown to have select uptake by cancerous cells. To test NM404's viability as a chemotherapeutic agent, it was applied to the neuroblastoma line NB-1691 in variable concentrations and over varying time periods. Both cell cycle and fragmentation due to NM404 were evaluated using Propidium Iodide (PI) via flow cytometry. Cell viability and death caused by NM404 were also assessed, this time in live cells, using Annexin V and PI.

THE ROLE OF PARENTS IN PROMOTING STEM MOTIVATION

Maria Mens, Judith Harackiewicz (Mentor), Psychology

U.S. students are falling behind in STEM education as these fields become increasingly important. In the current study, we examined whether parents who find utility value in STEM courses can transmit this value to their teens through conversations, and thereby increase their teens' STEM interest. We investigated whether the quantity and quality of parent conversations moderates their success in transmitting STEM value. We used data from the Wisconsin Study of Families and Work and examined parent and teen utility value perceptions, teen interest and course choice, and number of reported STEM conversations. We also coded parent interviews for aspects of how they would communicate STEM value to their teens and found this moderated their success in transmitting value.

OBESITY AND PARITY AFFECT THE MAMMARY GLAND SEROTONIN (5-HT) SYSTEM

Kathryn Merriman, Laura Hernandez (Mentor), Dairy Science

5-HT is involved in the mammary gland's response to consumption of high-fat diet (HFD) in rats. The objective of our study was to determine the effects of HFD and a HFD plus vertical sleeve gastrectomy (HFD+VSG) on the mammary gland serotonergic system compared to low-fat diet animals (LFD). We conducted qPCR analysis for the following mRNA in the mammary gland: tryptophan hydroxylase 1 (TPH1), the rate-limiting enzyme in 5-HT synthesis, serotonin reuptake transporter (SERT), responsible for the 5-HT reuptake into the cell for degradation, and the 5-HT 7 receptor subtype (HTR7), responsible for mammary gland involution. We concluded that in the mammary gland of normal weight animals with increasing parity an increase of 5-HT synthesis occurs and obese animals have over-production of 5-HT and signaling.

EFFECT OF HIGH VITAMIN D LEVELS ON THE ADAPTIVE IMMUNE RESPONSE TO TMEV INFECTION

Miranda Meyer-Zibolski, Julie Olson (Mentor), Neurological Surgery

The purpose of this research is to determine how high vitamin D levels prior to Theiler's murine encephalomyelitis virus (TMEV) infection affect the adaptive immune response and the development of demyelinating disease in the central nervous system (CNS), brain and spinal cord. Demyelinating diseases affect that ability of neurons to send and receive signals. The development of demyelinating disease in the CNS can be induced by injecting TMEV into mice. Vitamin D will be injected into mice before TMEV infection to ascertain its effects on the adaptive immune response and development of demyelinating disease. By identifying how vitamin D effects the adaptive immune response in the CNS, we can determine if vitamin D is a possible preventative measure against demyelinating diseases like multiple sclerosis.

INVESTIGATING CONSERVED REGIONS OF THE TURNIP MOSAIC VIRUS GENOME

Nicole Mihelich, Danielle Savino, Aurelie Rakotondrifara (Mentor), Plant Pathology

The Potyviridae family is the largest and most agronomically influential group of plant viruses. Better knowledge of the mechanism of viral infection can be a basis in advancement of protecting crops. Virus survival is dependent on the relations of the virus' genome and the host's protein production systems. Any minor change in the properties of this host-virus relationship can cause plant-virus interactions to become incompatible and prevent the virus from causing infection. This research project focuses on defining the functions of the highly conserved regions of the Potyviridae family genome using Turnip Mosaic Virus as a model. Deliberate alterations of individual TuMV genomic regions and subsequent mutations were assessed for efficiency of production of viable protein which corresponds to the survival of the virus.

WHEN DO TERRITORIAL CLAIMS CHANGE?

Alexander Milbrandt, Nadav Shelef (Mentor), Political Science

The purpose of the project is to collect data on when disputed territory changed hands and compare it with the timing of change in the claims to those lands by the territorial losers. We accomplish this by searching through domestic news for each country provided by the Foreign Broadcast Information Service database and by looking in primary sources for any visual evidence of changed claims. We are looking for patterns which can help explain why some territorial disputes have been resolved while others have not. My research has focused on claims to the territories of Walvis Bay in Namibia, West Irian in Indonesia, and Aouzou in Chad. So far in my research, states did not stop claiming a territory until they had received it back.

SCHOOL NURSE INTERVENTIONS FOR OPPOSITIONAL DEFIANT DISORDER: A REVIEW OF THE LITERATURE

Joseph Miller, Lori Anderson (Mentor), Nursing

Disruptive behavior disorders (DBD) have a negative impact on school performance and cause substantial caregiver strain. The purpose of this literature review was to explore oppositional defiant disorder (ODD), the most commonly diagnosed DBD in school-age youth, in order to establish best practices for school nurses. A search was conducted for peer reviewed articles and guidelines involving school nurses and ODD. A total of 14 articles were included in the final review. Results indicated that school-based interventions may be effective in the management of oppositional behavior both in the classroom and at home. Information from the literature review has been incorporated into a nursing reference application for iPad tablets that have been distributed to school nurses in rural southern Wisconsin.

SOCIAL, ECONOMIC, AND ENVIRONMENTAL SUCCESS OF MARINE PROTECTED AREAS

Katherine Mitchell, Erika Cardenas, Lawrence Neumann, James Berkelman (Mentor), Forest & Wildlife Ecology

There is concern over unsustainable extraction of marine resources worldwide. Continued misuse of marine resources could have devastating impacts on ecosystem function and people's livelihoods. Marine protected areas (MPAs) are a proposed method for protecting and conserving marine resources threatened by globalization and over-exploitation. While there is still debate over the ideal form of MPA management, evidence from established MPAs suggests they may be a viable option for sustaining and ensuring the health of marine ecosystems. In our evaluation, we focused on the effectiveness of MPAs based on ecological, social, and economic components. Drawing on several case studies from locations worldwide, we can evaluate if MPAs are a successful marine conservation strategy.

IMPACTS OF ECONOMIC AND ENVIRONMENTAL CONDITIONS ON THE STATE OF NORTH DAKOTA

Katherine Mitchell, Leann Tigges (Mentor), Community & Environmental Sociology

North Dakota sits on the edge of the Midwestern United States, rich in natural resources and scenic wildlife. This moderately-populated Great Plains state has benefited from a relatively strong economy in recent decades, but future prospects are now subject to rapid shifts of environmental and economic changes. Although its population has remained relatively low over the years, developments in oil drilling are bringing people looking to benefit from this valuable resource. Changing weather patterns may impact North Dakota's strong agricultural and tourism sectors. Such shifts are guaranteed to impact the community structures of the state, rural and urban alike. My research evaluates the interconnected social, economic and environmental patterns in North Dakota, and how they are likely to change the state in coming years.

REAL TIME WATER IMAGING SYSTEM

Nicole Mohapp, Chin-hsien Wu (Mentor), Civil Engineering

Madison area beaches have recently been struggling with water quality problems arising from high concentrations of aquatic microorganisms such as algae, E. coli, and other pathogens that can cause a variety of health issues in humans. Nevertheless current protocol used to monitor algae employs isolated water samples, which could not represent the algae concentrations of the beach as a whole and cannot determine movement of algae, and water circulation patterns. My research was to develop a multi-spectral bandwidth camera system to provide real time and spatial measurements of algae concentration.

DOWN'S SYNDROME IPSCS PROLIFERATE AT SAME RATES AS NORMAL IPSCS

Katharine Molinarolo, A Bhattacharyya (Mentor), Waisman Center

Down's Syndrome (DS) is a developmental disorder caused by trisomy of chromosome 21. To study this disorder, induced pluripotent stem cells (iPSC) were induced from DS fibroblasts and differentiated to study how specific cell types are affected. Previous studies have shown that DS cells grow more slowly than normal cells. Our hypothesis is that the iPSC proliferate more slowly than normal iPSCs. To study this question, immunofluorescence was performed using the markers Ki67 and PHH3. Ki67 is a protein that is active during any stage of the cell cycle whereas PHH3 is only active when a cell is in mitosis. The proportion of Ki67 and PHH3 positive cells was quantified and the results show that the DS and control iPS have similar proliferation rates.

DETERMINING THE TIME AND LOCATION OF EXPRESSION OF ATF2 IN AEDES AEGYPTI

Peter Monteagudo, Que Lan (Mentor), Entomology

The objective of my research is to explore mosquito control methods to decrease the incidences of vector-borne diseases including Malaria, Dengue, and West Nile. I am working with Activating Transcription Factor 2 (ATF2), a gene that facilitates a mosquito's ability to digest fat. By chemically or genetically disturbing this gene, the starvation rate of a mosquito increases. The current task is to determine where and when the ATF2 is expressed in mosquitoes. Lab techniques include reverse transcription of mRNA into cDNA as well as polymerase chain reaction (PCR) accompanied by gel electrophoresis. Bands in the 190 base pair region of the reference ladder indicate the presence of ATF2. Current results suggest that ATF2 is expressed in the larval and pupae stage in both male and female subjects.

HERBIVORY DEFENSE IN YELLOW MONKEYFLOWER: EFFECTS ON GENERALIST AND SPECIALIST HERBIVORES

Michael Montenero, Liza Holeski (Mentor), Richard Lindroth (Mentor), Entomology

Plants have undergone strong selection from herbivory, resulting in diverse physical and chemical defenses. Chemical defenses deter generalist herbivores, but are often tolerated by specialists. *Mimulus guttatus* (yellow monkeyflower) is a model genetic system with ecological relevance and has physical and chemical defense mechanisms. To examine the effects of these defenses on herbivores, we conducted feeding trials with *M. guttatus* and larvae of the specialist herbivore *Junonia coenia* (buckeye caterpillar) and the generalist herbivore *Grammia incorrupta* (woolly bear caterpillar). Specialist growth rate significantly exceeded generalist growth rate. In addition, number of trichomes, a physical defense of *M. guttatus*, showed a significant inverse relationship with specialist herbivore growth. In our research, specialists grew the most on *M. guttatus*, but generalists were most resistant to physical defense.

HOW CHILDREN ON THE AUTISM SPECTRUM RESPOND TO QUESTIONS POSED BY PARENTS

Rebecca Mostofi, Susan Ellis Weismer (Mentor), Communicative Disorders

The ability to answer questions is a notable area of difficulty for individuals with autism spectrum disorders (ASD). This study examined the relationship between the complexity of parent questions and language abilities in children with ASD. Participants included 40 children with ASD (60-76 months) and their parents. Parent questions during play-based language samples were coded based on question type, syntax, concept, and contingency. Correlational analyses showed that the complexity of parent questions was not associated with child language abilities or appropriateness of children's responses. However, the appropriateness of children's responses was related to their language production during the play sample ($r=.41-.60$, $p < .001$) and to their language comprehension on a standardized measure ($r=.35$, $p < .04$). Findings from this study have the potential to inform autism intervention practices.

EARLY SUBLETHAL TCDD EXPOSURE LEADS TO SKELETAL EFFECTS IN ADULT ZEBRAFISH

Kelly Mularkey, Warren Heideman (Mentor), Pharmaceutical Sciences

An important goal in improving human health is to understand how exposure to environmental toxicants during gestation and childhood leads to disease later in adulthood. 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) is a potent environmental toxicant, and has been shown to induce jaw and skeletal malformations in zebrafish. The purpose of this study was to determine if low levels of TCDD would produce a consistent pattern of bone changes in zebrafish, and which early life stage is most affected. To address this question we divided the zebrafish into two exposure groups: one exposed during embryogenesis (4hpf) and the second exposed during sexual differentiation (3 and 7 wpf). As adults, the fish were euthanized, stained, and measurements of the vertebrae and ribs were taken and compared against controls.

ENGAGE CHILDREN IN SCIENCE: DEVELOPING A SERVICE-LEARNING COURSE

Maura Mullen, Thomas Bryan, Katie Kennedy, Theresa Mueller, , Lawrence Neumann, Briana Nielsen, Alec Walker, Reid Woolworth, Dorothea Ledin (Mentor), Institute for Biology Education

How can we get kids interested in science? As peer mentors we collaborate to develop the service-learning course entitled, "Engage Children in Science." We mentor cohorts of students who lead science clubs in Madison-area schools and community centers. The science clubs supplement school science classes by allowing kids to explore science in an informal setting. We hope that by exposing kids to science in an informal way we will aid in their development of foundational science skills that will serve them in their future education. In order for our students to lead successful and effective science clubs that can achieve this goal, we provide them with tools and resources that they can use to improve their clubs and their own practices of science education.

DEVELOPING INTERVENTIONS TO HELP KIDNEY TRANSPLANT PATIENTS WITH THEIR SEXUAL CONCERNS

Andrea Muller, Rebecca Muehrer (Mentor), Nursing

Sexual concerns negatively affect the quality life of adult kidney transplant recipients (KTxR). Previous research identified 28 sexual concerns affecting KTxR. The purpose of this research was to develop web-based interventions to help KTxR with their sexual concerns. For each of the 28 concerns information was developed about: a) possible causes for the concern, b) relationship between the concern and transplant (if available) and c) things the patient can try to alleviate the concern. Information was developed through literature review, expert consultation, and clinical experience. The product of this research will be a website that KTxR can access at their convenience to help them with their sexual concerns. This will help to improve their quality of life and life satisfaction after a kidney transplant.

SYMPTOMS AND SELF-MANAGEMENT STRATEGIES IN PATIENTS RECEIVING TREATMENT FOR ADVANCED CANCER

Marissa Mullins, Katie Cyrzan, Kristine Kwekkeboom (Mentor), Nursing

Patients with advanced cancer experience noxious symptoms during cancer treatment. The purpose of this study is to describe patterns of pain, fatigue, and sleep disturbance among patients with advanced cancer and to identify their symptom self-management strategies. Seventy-eight patients with advanced lung, colorectal, prostate, or GYN cancers completed daily symptom diaries for 2-weeks during chemotherapy or radiation therapy. Participants rated the severity and distress of pain, fatigue, and sleep disturbance and described steps taken to manage these symptoms. Descriptive statistics will be used to summarize participant characteristics and symptom severity and distress. Content analysis will be conducted to identify the self-care

strategies used. Results will be discussed with respect to patterns of change in symptoms and the need for research and education on self-care strategies.

TEMPERATURE DEPENDENT EFFECTS ON ALFALFA POLLEN VIABILITY

Carly Murphy, Megan Van Etten (Mentor), Entomology

Pollen is a major vehicle for the transfer of genes among plant populations or gene flow. Since the establishment of transgenic crops, there has been increasing concern about unintentional and unwanted escape of transgenes via pollen. In order to minimize gene flow, it is essential to understand the factors affecting pollen transfer. How long pollen remains viable at different temperatures ultimately affects how far pollen can travel and set viable seeds. In this study, we collected percent germination data for pollen treated at room temperature, 32°C and 44°C for one hour and examined changes over time and across temperatures. We examined the effects of temperature on alfalfa pollen viability in order to ultimately determine how pollen viability affected gene flow.

FRAGILE X SYNDROME - INDUCED PLURIPOTENT STEM CELL RESEARCH

Michael Musser, A Bhattacharyya (Mentor), Waisman Center

Fragile X syndrome (FXS) is the most common identifiable single gene cause of autism. FXS is caused by genetic silencing of the Fragile X Mental Retardation (FMR1) gene due to multiple CCG trinucleotide repeats in the 5' untranslated region of the gene. In an effort to uncover the neurophysiological basis behind FXS phenotypes, we have generated human induced pluripotent stem cell (iPSC) lines from multiple FXS patients. These cell lines have been characterized to show expression of pluripotency genes, markers of pluripotent cells, and lack of FMR1 gene expression/FMRP protein. As the project moves forward, the iPSCs will be differentiated into mature neurons. In principle, this will allow for comparison of neural phenotypes between FXS cell lines and control lines.

PRESURGICAL PLANNING WITH FMRI IN VASULAR LESION PATIENTS: TASK AND STATISTICAL THRESHOLD EFFECTS

Tanvi Nadkarni, Vivek Prabhakaran (Mentor), Radiology

Lateralization of language-related neurological function in intra-cerebral vascular lesion patients are useful in guiding neurosurgeons in devising a surgical approach to treat vascular lesions. We hypothesized that language-related lateralization indices [LIs] would change depending on the statistical thresholds applied to the functional activation maps in vascular lesion patients. Patients with vascular lesions (N=47: Male: 22, Female: 25, average age: 48 years) performed language tasks while in the fMRI scanner. Frontal, temporal, and hemispheric LIs were calculated and analyses were conducted with the use of AFNI software to map activated regions of the brain. The expressive language tasks (antonyms/ letter generation) of patients showed statistically

significant differences between thresholds compared to controls, while the LIs derived based on receptive language tasks (e.g., text listening) did not show statistically significant differences.

FEATURE EXTRACTION IN FUNCTIONAL BRAIN IMAGING USING DIFFERENTIAL EQUATIONS

Atefeh Namvaryshad, Amir Assadi (Mentor), Mathematics

The goal of this project is to describe the time-dependent changes in fMRI data from regions of the human brain during specific tasks, and eventually, due to brain events that could be related to biochemical abnormality, as in mental disorders or initial stages of neurodegenerative diseases that are currently difficult to predict by a physician from conventional tests. We investigate a method for extracting information about biologically significant features of data based on "local linearization" methods, as it is often used in physics and engineering, and results in systems of "ordinary differential equations" (ODE) that describe the events locally. We apply this technique to fMRI data to describe changes in sufficiently small collections of voxels, which is then used to model the nonlinear dynamics of the brain activation, that is, to identify different features corresponding to different states of the voxels. Our solution to the feature extraction problem involves a novel modification of the statistical theory Principal Components Analysis (PCA) in order to filter the noise in data from small regions. We improve the signal quality by carefully "integrating the small local effects" into a more accurate signal. This qualitative discussion is implemented mathematically by finding the system of equations (ODE) that describe local changes by a vector field, in analogy to magnetic or electric vector fields. These vectors are tangent to a curve that is called an integral curve, i.e. the geometric solution of the ODE mentioned above. The integral curves represent "features of brain dynamics", depending on their mathematical properties (nonlinear features.) We use a modification of the Runge-Kutta algorithm for numerical solution of ODEs to construct the integral curves that provide us with features that potentially distinguish the level and kinds of activation at specific anatomical sites in the subject's brain.

FAMILY OWNED BREWERIES VS. PUBLICLY OWNED BREWERIES

Brad Nardick, Trey Bertram Debra Holschuh-Houden (Mentor), UW Family Business Center

Our project will focus on the success and challenges of family owned breweries in the United States compared to the publicly owned brewing powers that are trying to monopolize the beer industry. We will examine breweries such as Yuengling, Dogfish Head, New Glarus and several other family operating companies to gain a better understanding of the everyday struggles to maintain their position in an industry that continues to be overrun by publicly owned companies such as, Anheuser Busch and Miller Brewing Company. We will dive into the history of these companies as well as what the future will bring for family owned craft breweries throughout the country. We will examine the issues of succession within the families that own these breweries and how beer-brewing techniques are passed down from generation to generation.

EXAMING THE ROLE OF KLAR IN REGULATING SYNAPTIC GROWTH AND AXONAL TRANSPORT

Kathryn Narem, Barry Ganetzky (Mentor), Genetics

Nervous system diseases can be studied by furthering our knowledge about the proper growth and development of neurons. The neuromuscular junction is ideal for identifying genetic and molecular mechanisms that govern synaptic growth. A deficiency screening of the third chromosome in *Drosophila melanogaster* has led to potential genes that influence synaptic growth and development, one of which is *klarsicht* (*klar*). While *klar* has been shown to have roles in embryonic and eye development, its role at the neuromuscular junction and in synaptic growth has yet to be examined. This research will help advance the understanding of the growth and development of neuromuscular junctions and neural diseases.

PROFILES OF TREATED ALCOHOL DEPENDENT ADULTS INTERESTED IN MINDFULNESS MEDITATION THERAPY

Elizabeth Nguyen, Aleksandra Zgierska (Mentor), Family Medicine

PURPOSE: Evaluate the effects of meditation for alcohol relapse prevention. **DESIGN:** 52-week long randomized controlled trial: meditation versus control group. **PARTICIPANTS:** Alcoholics in early recovery. **MEASURES:** Timeline Followback, Symptom Checklist 90-R (cross-sectional analysis of baseline data for the present study). **RESULTS:** 123 enrolled subjects were 41±12 years old, 57% male, 91% white, 47% college graduates, 45% earning <\$20,000/year, and 41% married/partnered. At baseline, they drank on 58-63% of days, with most days with heavy drinking (5+ drinks for men, 4+ for women), consuming 180±155 drinks per 28 day-period. They suffered from anxiety and depression much more (96-97th percentile) than the general population. **CONCLUSIONS:** These findings elucidate characteristics of alcoholics who seek treatment, and are crucial for the development of effective therapies for relapse prevention.

DOES LISTENING TO DAILY NUTRITION PODCASTS INFLUENCE FRUIT AND VEGETABLE INTAKE?

Emma Oanes, Diane Lauver (Mentor), Nursing

Today obesity is a challenge to individuals and the US healthcare system. One important factor contributing to obesity is dietary intake. Our study purpose was to look at whether listening to nutrition podcasts influenced peoples' fruit and vegetable intake. Using a one-group design, we recruited rural, working, low SES participants in the mid-west. We provided 12 adults with MP3 players, asked them to listen to pre-loaded nutritional podcasts daily over four weeks, and complete daily logs of fruit-vegetable intake. At weeks 2, 3, and 4, participants' fruit-vegetable intake was 4.8, 4.1, and 4.6 servings, respectively. When listening to morning podcasts, participants' fruit-vegetable intake was higher later that day. Findings can guide future researchers in technology-based interventions for obesity prevention and control.

ROLE OF ETC COMPLEX IV INHIBITION IN INFLUENZA PROLIFERATION SUPPRESSION

Katherine Omernick, Linhui Hao (Mentor), Institute for Molecular Virology

In a recent genome-wide RNAi screening study, our group found that influenza type A requires the host gene COX6A1, which encodes a subunit of the host mitochondrial electron transport chain complex IV. When complex IV was chemically inhibited in host cells viral proliferation was significantly suppressed, while under the same condition, cell viability was unaffected. To determine whether viral proliferation is prevented by either a block in transcription or replication, this study will 1) compare the influenza vRNA, mRNA and cRNA levels in influenza virus infected cells between complex IV inhibited cells and untreated cells 2) compare vRNA, mRNA and cRNA levels between complex IV inhibited cells and untreated cells in host cells infected with mutant influenza viruses.

PROSTAGLANDIN FORMATION EFFECTS OF CEREBRAL BLOOD FLOW IN METABOLIC SYNDROME

Keelin O'Neil, William Schrage (Mentor), Kinesiology

The purpose of this research is to determine whether or not prostaglandin formation in adults with metabolic syndrome is impaired. A prostaglandin is a lipid complex that contributes to vessel dilation when exposed to stimuli. Indomethacin is a drug that inhibits formation of prostaglandins. We hypothesize that metabolic syndrome subjects will experience little or no change in blood flow after the dosage of Indomethacin. In this study we use human subjects with metabolic syndrome and lean subjects as controls. After administering a dose of Indomethacin or a placebo, the middle cerebral artery is monitored as the subject is exposed to hypoxia and hypercapnia. These findings would provide additional knowledge about cerebral functioning in metabolic syndrome, sleep apnea, and people with high risk of stroke.

HAND HYGIENE OBSERVATIONS

Larissa Ostfeld, Nasia Safdar (Mentor), Medicine

This year long observation based research aims to relate the prevalence of hand sanitization noncompliance incidents, with nosocomial infection trends. For over one hundred years, the educated understood that hand washing effectively eliminates pathogenic, transient flora, the primary cause of disease spread, from skin surfaces; nevertheless, for unknown reasons, many overlook this simple endeavor. Observers use a standardized sheet indicating the audit date, ward, and time. The data consists of the type and action of the employee, glove use, and status of compliance. After compiling at minimum one hundred observations per ward each month, individuals submit the data sheets for computer analysis to develop statistical trends and correlations. While thus far relationships to infection are inconclusive, a marked increase in compliance can be noted.

THE EFFECTS OF PARKINSON'S AND AGING ON UPPER-RESPIRATORY TRACT SENSORY-MOTOR COORDINATION

Ian Padron, Michael Hammer (Mentor), Otolaryngology

Previous work suggests that somatosensory nerves in the upper-respiratory tract contribute to the coordination of complex movement patterns involved in swallowing, speech production, and respiration. Our research seeks to thoroughly explain how degradation in this sensory innervation may relate to upper-respiratory motor deficits in aging and Parkinson's disease. By streamlining the processes by which we analyze and characterize various tissue samples, parallels may be drawn between samples. For the study, larynges from rats are stained with antibodies sensitive to specific proteins and cell markers in the nervous system to provide a readily observable sample of the intricate innervation of the tissue. By observing differences in the nervous tissue of these samples, the brain of the same animal can be analyzed as well, to examine the association between central and peripheral degeneration. In essence, the present work is only the stepping stone to the ultimate goal to refine a method in which we can efficiently discriminate between a healthy larynx and one subjected to some sort of nerve malfunction or degradation such as Parkinson's or aging.

SYMPTOMS OF THE BROADER AUTISM PHENOTYPE AND MARITAL QUALITY

Molly Palzkill, Sigan Hartley (Mentor), Human Development & Family Studies

Parents of individuals with autism spectrum disorders (ASD) are at risk of evidencing the broader autism phenotype (BAP), involving mild and subtle impairments in communication, social reciprocity, and restricted interest/rigid personality traits. In the present study, we assessed BAP symptoms in 46 married couples that have a child with an ASD using the Broader Autism Phenotype Questionnaire (BAPQ; Hurley, Losh, Parlier, Reznick, and Piven). We examined the relationship between BAP symptoms in one or both partners and marital satisfaction and marital conflict.

THE ROLE OF NF-KB IN BONE MARROW DERIVED MESENCHYMAL STEM CELL BIOLOGY

Surabhi Pancholi, Peiman Hematti (Mentor), Medicine

The purpose of this research is to identify the potential role of Nuclear Factor kappa B (NF-kB) in Mesenchymal Stem Cells. Mesenchymal Stem Cells (MSCs) are a population of cells present in many different tissues with multi-differentiation and immune modulation properties. The first phase of this project will involve the characterization of bone marrow derived MSCs by flow cytometry and differentiation into specific lineages of bone, fat, and cartilage. The MSCs will then be activated with interferons to study NF-kB activation by flow cytometry and cellular staining. Level of NF-kB expression will then be correlated with immune modulation capabilities for MSCs. Our goal is to define the role of NF-kB in the immunomodulatory properties of MSCs.

COMPARING METHODS FOR ELICITING HEALTH PROMOTION STRATEGIES IN CAREGIVERS OF CHILDREN WITH AUTISM

Brenna Patterson, Kayla Larsen, Elizabeth Larson (Mentor), Kinesiology

Mothers of children with autism often experience intensive care-giving demands that limit their capacity to engage in wellness-promoting activities. Motivational interviewing has been demonstrated to be a highly effective method to promote lifestyle change and may increase the amount of information disclosed, improving the personalization of and motivation for lifestyle change. We conducted a secondary analysis of interviews comparing two studies that examined lifestyles of four caregivers of children with disabilities. The first study used qualitative interviews to examine activities or strategies caregivers used to manage stress; the second used motivational interviewing to identify activities caregivers desired to engage in that would promote their well-being. Verbatim transcripts of interviews from both studies were coded by the research team using a constant comparative method. We plan to identify health promotion activities and strategies that fit caregivers' lifestyles.

FYODOR DOSTOEVSKY: CHAPTERS FROM THE UNDERGROUND

Ben Pauley, Richard Avramenko (Mentor), Political Science

Despite the long history of scholarship pertaining to the works of Fyodor Dostoevsky, his political ideas are afforded little attention. The goal of this project is to create an edited volume that addresses this gap in the scholarship. The project requires a number of technical tasks, including editing the content and substance of various chapters, as well as formatting and creating a bibliography through EndNote for the volume as a whole. As an Undergraduate Research Scholar, I will attend to these editorial tasks with the goal of creating a completed manuscript by this coming summer.

LES CHANSONS A MONTMARTRE: THE SIGNIFICANCE OF CABARET MUSIC IN FRENCH ART SONG

Katherine Peck, Paul Rowe (Mentor), Music

French Cabaret music was an amalgamation of the art songs of the salons and the chansons of the streets, deeply influenced by the "bourgeois" musical traditions of the salon and conservatoire and the socio-political atmosphere following the Paris Commune. In my research I will examine the music and poetry of the original cabarets artistiques and compare them to art songs written by Parisian salon composers, analyzing their reciprocal influences and establishing an artistic and historical context. The result of this research will be a synthesis of musical, artistic, and socio-political developments. It will expose an overlooked wealth of musical works to be explored, studied and performed, and will elucidate the social and artistic atmosphere of the Third Republic (1870-1940) within a musical and historical context.

INVESTIGATION OF THE ROLE OF DLC1 IN SINGLE CELL WOUND REPAIR

Ross Pedersen, William Bement (Mentor), Zoology

Single cell wound healing is regulated in part by concentric rings of two Rho GTPases, RhoA (inside ring) and Cdc42 (outside ring), surrounding the damage. Deleted in Liver Cancer 1 (Dlc1) inactivates RhoA, and is thus a possible regulator of Rho GTPases in the wound response. I wounded oocytes of *Xenopus laevis* and determined via fluorescence confocal microscopy that Dlc1 colocalizes to wounds with Cdc42. Based on this information I hypothesized that Dlc1 acts to keep RhoA out of the surrounding Cdc42 zone. Overexpression of Dlc1 causes abnormal healing phenotypes, however; dominant negative experiments, simulating loss of protein function, failed to interfere with healing. My data indicate that Dlc1 is dispensable in single cell wound healing, but that overexpression can have nonspecific global effects.

PHONETIC PHENOMENA IN THE SPANISH OF HERITAGE SPEAKERS

Gina Perez, Rajiv Rao (Mentor), Spanish and Portuguese

We are examining the Spanish language and how certain factors affect how speech is developed in native Spanish speakers. The main objective is that we are basically looking at the correlation between pronunciations of various sounds and pitch patterns and language history, including educational background, to see why there is so much variation in heritage speakers. We want to pinpoint what background variables may be the most influential in creating variation in pronunciation. Some very preliminary findings indicate that the most influential variable is educational background. We see that those who attended bilingual education programs as kids seem to have maintained the most native-like pronunciation of a variety of sounds and those of interest are the 's', 'r', 'd', 'b', 'g', 'p', 't', 'k' sounds.

STRING QUARTET NO. 1 - MUSICAL UNDERSTANDING AND APPRECIATION

Maxwell Perkins, Stephen Dembski (Mentor), Music

My String Quartet No. 1 deals with the idea of musical understanding and appreciation. Two movements are completed and were performed February 7, 2012 at Morphy Hall in Madison. I noticed that my fellow colleagues in the music school seemed to appreciate the first movement, whereas the non-music major listeners seemed to enjoy the second movement. This intrigued me, because I figured this would be the reaction. The first movement has a certain amount of clashing sounds and unpredictability that forces you to actively listen. The second movement is all in one key area with an easy form and memorable melodic ideas. I want to write another movement that successfully combines the ideals of the other two movements, that is, be accessible yet musically challenging.

AFTER THE WAR: THE ROLE OF MUSEUMS IN CULTURAL PATRIMONY IN POST-REVOLUTIONARY LATIN AMERICA

Brooke Perry Hoesli, Guillermina De Ferrari (Mentor), Spanish and Portuguese

Museums have a powerful role in the advancement and preservation of culture. This study works to analyze the distinct "levels" of museums, who oversees their administration, and societal perception of participation in cultural patrimony within both national and community-level museums. Via careful analysis of case studies of both national and community level museums in El Salvador and Mexico, this study proposes that museums are a product of the social determinants of the community in which they are situated. Issues of indigenous representation, authoritarian rule, as well as how access issues and political agendas of the elite in these two nations are closely examined in order to draw conclusions related to heritage preservation in post-revolutionary Latin American nations.

EFFECTS OF AGE AND HEARING LOSS ON THE AUDITORY MIDDLE LATENCY RESPONSE

Kelsey Peters, Jennifer Nguyen, Cynthia Fowler (Mentor), Communicative Disorders

The purpose of this research is to determine the effect of hearing loss and age on the amplitudes of the scalp-recorded auditory brainstem response (wave V) and the auditory middle latency response (Pa wave). Younger and older adults were exposed to clicks and tone bursts in quiet and noise-simulated hearing loss. In quiet, wave V amplitudes were larger in younger adults, but Pa was larger and more variable in older adults. In the simulated hearing loss condition, Pa amplitudes were suppressed more in older adults compared to younger adults. Results provided evidence that neurological changes in the auditory brainstem and cortex underlie complaints of older adults that they have difficulty hearing in noisy environments.

LINKAGES BETWEEN EARLY CHILDHOOD EXPERIENCES AND YOUNG ADULT INTIMATE RELATIONSHIPS

Brett Peters, Brittany Beispel, Katie Kennedy, Lauren Papp (Mentor), Human Development & Family Studies

While childhood experiences and intimate relationships are domains that affect everyone, these topics have yet to be thoroughly investigated in combination with physiological reactivity. Our study is designed to investigate the effects of one's childhood family environment on stress induced by conflict related to one's intimate relationship. In order to measure these variables, 59 heterosexual couples were brought into the lab to engage in a conflict discussion and complete a risky childhood family questionnaire. Salivary cortisol measures were taken at 3 different time intervals to assess baseline, reactivity, and recovery levels of cortisol. We predict that participants who scored higher on the risky childhood family questionnaire will have increased cortisol levels in response to conflict. The relations will be examined using dyadic growth curve models.

DESIGN OF AN ANTIMICROBIAL SURGICAL DRAIN TUBE: CIDALSEAL

Laura Platner, Kelsey Hoegh, Tanner Marshall, Taylor Powers, Danny Tighe, Mitchell Tyler
(Mentor), Biomedical Engineering

Dr. Samuel Poore, a plastic surgeon at the UW hospital, specializes in mastectomies and breast reconstruction operations. An accumulation of fluid within the body cavity commonly results from these procedures, and is drained using a surgical drain tube. This tube remains in place for up to 14 days, and increases patients' infection risk. Upwards of 20% of patients develop an infection and 5% require surgical intervention to address the infection. Dr. Poore asked the design team to develop a drain tube which will effectively reduce these problems. Thus, the CidalSeal, a drain tube attachment device, was developed. The device is composed of a silicone cap, and both CHG and Silver Sulfadiazine impregnated concentric foam discs. Testing has shown an effective bacterial protection for fourteen days.

RNA BINDING PROTEIN HUD REGULATES DIFFERENTIATION AND PROLIFERATION OF ADULT NEURAL PROGENITOR CELLS

Eric Polich, Xinyu Zhao (Mentor), Neuroscience

Neurogenesis in the adult brain has been shown to exist primarily in the dentate gyrus (DG) of the hippocampus and the subventricular zone (SVZ) of the lateral ventricles. Here, we examine the role of neuronal RNA binding protein HuD in adult neurogenesis. Preliminary data shows HuD can regulate these two distinct neurogenic sites in significantly different manners. Acute knockdown of HuD leads to decreased neuronal differentiation in the SVZ but increased neuronal differentiation in the DG. Over expression of HuD leads to increased neuronal differentiation in the SVZ but decreased neuronal differentiation in the DG. The mechanism behind this is still unclear. The goal of this project is to understand role of HuD in the complex regulatory networks governing adult neural stem cells.

A SINGLE RESIDUE ARG43 IN BRAZZEIN, A LOW-CALORIE PROTEIN SWEETENER, COMPLETELY ABOLISHES SWEETNESS

Sarah Porter, Fariba Assadi-Porter (Mentor), Biochemistry

Brazzein, a single polypeptide protein originally derived from the fruit *Pentadiplandra brazzeana*, consists of 54 amino acids without carbohydrates. Despite its lack of carbohydrates, this protein has sweetness properties that strongly resemble those of carbohydrate sweeteners. A single mutation at position 43 to alanine (Arg43Ala) results in almost complete loss of brazzein sweetness. To understand the structural role of Arg43 on the sweetness we have overexpressed wild type and mutant proteins in *E. coli* and double-labeled with ¹³C¹⁵N isotopic labeling to examine the changes in protein folding and heat stability by the reversed-phase HPLC and the backbone fingerprint region using nuclear magnetic resonance (NMR) spectroscopy. These studies will allow us to gain valuable information about brazzein sites of interaction with the sweet taste receptor and construction of more potent low-calorie sweeteners.

CHARACTERIZATION OF THE ABORTIVE INITIATION PRODUCTS OF E. COLI RNA POLYMERASE

Mikaela Poulos, Sara Heitkamp (Mentor), Biochemistry

RNA polymerase (RNAP) is a molecular machine that drives every stage of transcription by interactions with specific DNA sequences. Recent studies have shown that RNAP undergoes several conformational changes on the pathway to transcription initiation. In this study, we have used fluorescence assays to compare the rates of synthesis of the short abortive products during initiation for two different promoters, the lambda phage PR promoter and the T7 phage A1 promoter. We monitor incorporation of single NTPs using a fluorescent tag (ANS) on the gamma phosphate. The NMP is incorporated into the growing RNA chain and ANS-PPi is released, causing a 14-fold fluorescent increase. This assay has allowed us to quantitatively determine the rate of incorporation at the +3 NTP position for both promoters. Long term, we will use this information to compare the abortive and productive rates for different RNAP promoters.

ANALYSIS OF SNOWMOBILE INJURIES OF PATIENTS OF UNIVERSITY OF WISCONSIN HOSPITAL, MADISON

Aisha Prasad, Tommy Yu (Mentor), Orthopedics and Rehabilitation

The objective of this study is to find patterns and trends in snowmobile injuries of residents of Wisconsin and its neighboring states, as well as ways to prevent the most common injuries. The research is retrospective research. The data collected will be collected from the medical records of patients who were admitted to the University of Wisconsin Hospital in Madison and will be analyzed. Preliminary research has been completed, and we are currently in the process of sending the Institutional Review Board (IRB) protocol to the IRB. Although there are detailed fatality reports for snowmobile crashes, there is minimal research available for non-fatal injuries. The results of our study are currently being analyzed.

ORIENTING SINGLE-WALLED CARBON NANOTUBES WITH TITANIA NANOCRYSTALS FOR HIGHER-EFFICIENCY SOLAR CELLS

Frederick Prehn Jr, Michael Arnold (Mentor), Materials Science & Engineering

With an increasing need to find cheaper forms of renewable energy, research into finding alternatives to expensive silicon solar cells has become more prevalent. Completed work on using organic materials for photovoltaic capture of solar energy demonstrated that organic materials such as semiconducting polymers and small molecules have the potential to lower the cost of solar photovoltaic technologies. This project is devoted to improving the photovoltaic efficiency of a previously studied material system that uses carbon nanotubes as the photoabsorbing species. The efficiency could potentially be increased if more nanotubes are in contact with the accepting species. Adding TiO₂ nanocrystals as mechanical "proppants" for the nanotubes is the scope of this project, as they have the possibility of forcing the nanotubes to lie out of the plane of the transparent conducting substrate [indium-tin oxide (ITO)], allowing for more charge transfer and hence a higher power conversion efficiency.

PRECISION MEASUREMENT OF THE SOLAR DIPOLE USING ICECUBE

Craig Price, Paolo Desiati (Mentor), Astrophysics

Using IceCube, a large particle detector located under the surface of the South Pole, we studied the cosmic ray plasma that surrounds the Earth. Specifically, we observed the change in frequency of incoming cosmic rays depending on the relative motion of the Earth around the Sun. The complicating factor in this analysis is to determine the interference between Earth's revolution around the Sun and any extra-terrestrial source of cosmic rays. We perform this analysis with an unprecedented dataset - three years of IceCube data.

CHARACTERIZATION OF EPH AND EPHRINS IN HUMAN NEURAL PROGENITOR CELLS USING IMMUNOCYTOCHEMISTRY

Alexandra Procak, Thomas Keenan (Mentor), Biomedical Engineering

Eph and Ephrins are signaling molecules that play a role in cerebral cortical development. Ephs are membrane bound receptors and ephrins are the membrane bound ligands. Previous studies have found key Eph/Ephrin signaling pairs to play a role in axonal guidance to specific cortical layers, laminar organization and neuronal differentiation. Our research aims to characterize the expression of individual eph and ephrins in order to gain insight into their effects on human neural progenitor cells (hNPCs) proliferation and differentiation. This characterization will be evaluated using immunocytochemistry staining. These methods will allow for a visual characterization of the expression of various ephs and ephrins in hNPCs.

ATTITUDES TOWARDS THE ASTURIAN AND CASTILIAN LANGUAGES IN ASTURIAS, SPAIN

John Prusynski, Rajiv Rao (Mentor), Spanish and Portuguese

The perception of a minority language within a community has an influence on its use, and use of a language by young native speakers can determine its survival. This project investigates perceptions of and attitudes towards Asturian and Castilian amongst young Asturians. Interviews were conducted with 29 Asturians ages 18 to 30, and each completed a corresponding written questionnaire. The interviewees included both native Castilian speakers and native Asturian speakers. The expected outcome is that perceptions of the Asturian language will be positive among young Asturians, but that use, and perception of use by other young Asturians, will be low. The hope is that the study will expose perceptions among young Asturians that might encourage or discourage their continued use of the language.

THE USE OF SOCIAL NETWORK SITES IN HEALTHCARE RESEARCH: HERE AND ABROAD

Megan Pumper, Megan Moreno (Mentor), Pediatrics

The use of social network sites (SNSs) in healthcare research is increasing in the United States. It is unknown if SNSs could be used in research in other countries, specifically in less developed countries, like Ecuador. This study aimed to examine the feasibility of using SNSs through assessing popularity and opinions of SNSs. US and Ecuadorian university students (N=125), ages 18-22 years, were asked about their daily use and views of SNSs and the Internet. US students used SNSs more and had more positive views of SNSs than Ecuadorian students, but used the Internet the same amount. US and Ecuadorian students use and view SNSs differently. These differences illustrate that cultural considerations should be taken when using SNSs in global research.

ANTITUMOR EFFECT OF 5-FLUOROURACIL IN COMBINATION WITH ANTI-CD40/CPG

Xiaoyi Qu, Paul Sondel (Mentor), Human Oncology

Tumor growth is accompanied by influx of myeloid-derived suppressor cells (MDSC). 5-fluorouracil (5FU) has been shown to selectively deplete MDSC. Previous studies in our lab demonstrated the antitumor effect of anti-CD40 mAb and CpG in B16 tumor bearing (TB) mice. We hypothesized that 5FU can be used to determine a role of MDSC in the antitumor effect of anti-CD40 and CpG. Using the intraperitoneal B16 melanoma model, we showed that TB mice treated with 5-FU had a significant reduction of MDSC in the peritoneal cavity. The combination treatment of 5-FU and anti-CD40/CpG resulted in the similar antitumor effects compared to each treatment alone. Thus, the role of MDSC could not be determined due to the high sensitivity of B16 melanoma to 5FU.

THE EFFECTS OF FAMILIAL HYPERCHOLESTEROLEMIA ON CALCIFIC AORTIC VALVE DISEASE

Ashley Quinn, Chloe McCoy (Mentor), Biomedical Engineering

Calcific aortic valve disease (CAVD) is a disorder characterized by valve calcification and stenosis. The hallmark of Familial Hypercholesterolemia (FH) is increased plasma low-density lipoprotein (LDL) caused by a genetic mutation in the LDL receptor. Since elevated LDL is a risk factor for CAVD development, this study will investigate the relationship between FH and CAVD onset. Various disease markers will be measured in porcine FH aortic valve leaflets using immunocytochemistry compared to non-FH control leaflets. In comparison to control samples, the leaflets with FH mutations are expected to express increased levels of disease markers due to exposure to high plasma lipid levels. Results of this study will improve our understanding of the role of increased plasma lipid levels in the development of CAVD.

HOW PALLIATIVE CARE NURSES PREPARE FAMILIES FOR THE DEATH OF A LOVED ONE

Michelle Radle, Kathryn Michalski, Sarah Violante, Karen Kehl (Mentor), Nursing

Palliative care nurses (PCNs) often prepare families for death, but little is known about what is included in such preparation. The purpose of this study was to identify the content, timing, and tailoring of PCNs' messages to prepare families for death. A survey was sent to 1,190 PCNs in the Hospice and Palliative Nurses Association and 565 nurses responded. Most PCNs agreed that family can be prepared for the death (83.9%). Preparatory messages were usually given over time (63.9%) and tailored (81.6%) based on family cultural background (86.5%), desire for knowledge (86.2%), spiritual beliefs (81.8%), and education (81.4%). Family caregivers who are unprepared for death experience more depression, anxiety, and complicated grief. This research could be used to better educate families in the future.

A STUDY OF THE CONSTRUCTION OF CHILDHOOD VULNERABILITY IN RURAL MALAWI

Laura Raicu, Naman Siad, Kirk Anderson, Nancy Kendall (Mentor), Educational Policy Studies

Rural Malawian children are affected by various forces considered causes of vulnerability, including high poverty and disease. Government and international efforts to find and support vulnerable children are hampered by lack of understanding of diverse local constructions of vulnerability. This study investigates international, government, and community understandings of vulnerability, and children's academic involvement and schooling outcomes. We are coding and analyzing observations, notes, and interviews collected in four villages from 2008 to 2011. Themes to date include significant differences in government, school, and community definitions of vulnerability, child movement between households, particular vulnerability among children living with grandparents or older orphans, and "education as salvation". This research will inform international development efforts by giving voice to children often targeted but seldom heard by aid organizations.

DEFINITION OF THE HOMELAND: CASE STUDY OF THE ABU MUSA AND TUNB ISLANDS

Jorge David Ramos-Mercado, Nadav Shelef (Mentor), Political Science

"Do states ever abandon the claims to territories that they lost to other states? Using the Foreign Broadcast Information Service (FBIS) I traced the public claims made by Iran and the United Arab Emirates (UAE) to the Abu Musa and Tunb Islands between 1971 and 1996. The UAE claimed in 1975 that the islands were part of the Al-Sharjah emirate before Iranian troops annexed them in November 29, 1971 and they maintained the claim through 1996. Meanwhile, Iran claimed through 1996 that the islands were traditionally theirs despite British giving them to the UAE. After the Iran-Iraq War these islands gained greater significance as part of the Iranian homeland.

AMYLOID PROTEIN BUILDUP IN DOWN'S SYNDROME PATIENTS

Kireeti Reddy, Sigan Hartley (Mentor), Human Development & Family Studies

Adults with Down syndrome are at high risk for developing Alzheimer's disease due to the presence of an extra copy of chromosome 21, which codes for the amyloid-beta ($A\beta$) precursor protein (APP) gene. The purpose of this study is to examine early cognitive changes in relation to amyloid deposition in 40 adults with Down syndrome who are asymptomatic for dementia. Participants completed a battery of neuropsychological measures of memory and learning. Adults with amyloid deposition evidenced a lower mean score on several neuropsychological measures, with differences approaching statistical significance on measures of executive/working memory, delayed recall, and attention/processing speed.

METABOLIC PATHWAY STUDIES OF 3-IODOTHYRONAMINE (T1AM) ON LIPID METABOLISM BY NMR SPECTROSCOPY

Hannah Reiland, Fariba Assadi-Porter (Mentor), Biochemistry

3-iodothyronamine, or T1AM, is an endogenous compound derived from the thyroid hormone, with effects opposing the thyroid hormone. It is thought that T1AM causes a switch from carbohydrate to lipid catabolism. The molecular mechanism of T1AM is currently unknown. To gain insight into importance of T1AM metabolic action, mice received week-long, daily, T1AM administration and were compared to the control treated with vehicle. Breath data from the T1AM-treated mice indicated that T1AM has fast action on lipolysis. We have collected serum for nuclear magnetic spectroscopy (NMR-) based metabolomics to determine the presence and concentration of key metabolites in lipid metabolism and to understand metabolic pathways that are affected by T1AM. Discovery of this pathway may increase T1AM's potential as a future human weight loss drug.

CHARACTERIZING THE GENETIC REGULATION OF THE FAB-ACPP LOCUS IN ESCHERICHIA COLI

Brian Rekoske, Richard Gourse (Mentor), Bacteriology

Lipid biogenesis in bacteria is coordinated to growth rate (protein synthesis rate) through the regulation of enzyme activities. Consequently there has been little attention paid to whether this well known biochemical pathway is genetically regulated as well. However, several recent transcriptome analyses have suggested there might be global regulation of lipid metabolism genes during growth arrest. In particular, some fatty acid synthesis genes appear to be inhibited in a ppGpp/DksA dependent manner. In this study, we tested the control of the fab-acpP locus in Escherichia coli, which includes several genes responsible for fatty acid synthesis. We showed that all the promoters of this locus are inhibited by ppGpp/DksA. Since many of these promoters are inhibited directly by ppGpp/DksA in vitro in a purified transcription system, we conclude that much of the regulation is direct. In addition, the transcriptional regulator FadR activates the fabH promoter, a promoter previously not thought to be affected by FadR. These data show that the

stringent response affects FadR-dependent and independent promoters and expands the role of FadR in controlling both degradation and synthesis of fatty acids.

CHILDREN WITH EPILEPSY: A STUDY OF WHITE MATTER CONNECTIVITY USING TRACTOGRAPHY

John Renfrew, Ishmael Amarreh (Mentor), Neuroscience

Introduction: Pediatric epilepsy is a prevalent neurological disorder; and the etiology and natural history of this disorder is poorly understood. Epilepsy is classified a priority research area by the National Institute of Neurological Disorders and Stroke. (Curing Epilepsy 2007: Translating Discoveries into Therapies). The aim of this study is to characterize abnormalities in baseline and prospective cerebral white matter development, and determine the clinical significance of identified abnormalities in new-onset pediatric epilepsy through diffusion tensor imaging (DTI). We predict that microstructural abnormalities of clinical consequence (cognition) will be detected by DTI in children with epilepsy. The goal of utilizing this methodology is to augment and corroborate abnormalities of brain connectivity in pediatric epileptic patients. Methods and Materials: Research participants included four epileptic adolescents, and four controls of healthy first-degree cousins. The participants underwent a Diffusion tensor Imaging (DTI) scan with following parameters: TR = 4500ms, TE = 71.8ms, field of view = 24cm x 24cm, 21 contiguous slices, 3mm slice thickness. The amplitude of the total diffusion gradient was 40 mT/m and was applied in 25 non-collinear directions uniformly distributed in three-dimensional space. All DTI images ($b=0$ sec/mm² and $b=1001$ sec/mm²) were acquired 2 times. The duration of the DTI scan was 9 minutes and 12 seconds. From the DTI data, we created whole brain white matter tracks for each subject with the Camino Diffusion Toolbox. Then we used TrackVis to visualize and generate specific tracks of the cingulum. Results and conclusion: We found a difference in cerebral white matter microstructure between subjects and normals. Fig 1 shows the difference in white matter tracts (control > subjects).

GENDER AND THE FAMILY BUSINESS

Rachel Resnick, Debra Holschuh-Houden (Mentor), Business Outreach

This project will attempt to emphasize the issues faced between gender and family business. Some feel that gender can help to determine the success of the family business. Although the traditional role of the male and female continues to encompass our lives today, as a society we have become accustomed as to what is expected from each gender. Whether it has to do with family succession planning or just the everyday treatment it is evident that gender plays a large role in the family business. Some even argue that gender is the most significant determinant of succession outcomes. Women are often seen as "unviable, and invisible", although women obtain strong credentials they are typically unrecognized or unacknowledged as a leader by the family business. For my project I will analyze multiple family businesses to better my grasp on gender inequality.

LAND USE, WATER QUALITY AND HUMAN HEALTH IN RURAL ECUADOR

Kirsten Rhude, William Klein, Lindsay Raab, Catherine Woodward (Mentor), Institute for
Biology Education

We established a service-learning course and community-based research project in the Manabí Province of coastal Ecuador in conjunction with the Ceiba Foundation for Tropical Conservation to monitor the impact of land use on water quality. We set up long-term study sites on four rivers and collected water quality data such as turbidity, dissolved oxygen, stream flow, habitat assessments, macroinvertebrate samples and *E. coli* levels. After offering a training workshop to teachers at the local high school, we assisted them in presenting a week-long stream ecology and water sampling course to their students that included both classroom and field sessions. Our efforts helped to lay the groundwork for a new service-learning course for UW students and a developing citizen-based stream-monitoring program.

THE ROLE OF FIBRONECTIN IN CELLULAR MIGRATION

Andrew Riching, Suzanne Ponik (Mentor), Molecular Biology

High mammographic density correlates to a four to six-fold increased risk of developing breast carcinoma, making it the single biggest risk factor for breast cancer. Dense tissue is comprised of many proteins, including fibronectin, which is generally absent in the adult mammary gland, but up regulated during oncogenesis. While this suggests a role for fibronectin in tumor progression, relatively little is known about the cellular mechanisms involved. The goal of this study is to determine fibronectin's role on cell invasion. Using a reverse trans-well assay with normal mammary epithelial cells in variable type I collagen and fibronectin concentrations, changes in cell invasion were evaluated. Our preliminary results suggest that denser concentrations of fibronectin result in a higher degree of invasion, symbolizing a more metastatic phenotype.

VERTICAL DISTRIBUTION OF MICROBIAL ENZYME ACTIVITY WITHIN HORIZON IN PICNIC POINT SOILS

Jessica Rippe Martinez, Ashly Smith (Mentor), Soil Science

The purpose of this research is to determine the vertical distribution of microbial extracellular enzyme activities in deciduous woodland soils located at Picnic Point in Madison, WI. Microbial extracellular enzymes catalyze many important biogeochemical reactions in the soil, such as those involved in carbon cycling. Samples were collected from each soil horizon, which are the different layers of the soil, from two replicate soil pits at Picnic Point. Enzyme activity for each horizon was measured using a biochemical assay with fluorescent-linked substrates. Abiotic factors such as nitrogen, carbon, pH and particle size were also tested. As the majority of studies limit their findings to the top 10cm of soil, the findings of this study can be used to understand microbial carbon cycling activities throughout the entire soil profile.

FKBP5, NPY, BEHAVIORAL INHIBITION, AND SOCIOECONOMIC STATUS AS RISK FACTORS FOR ADOLESCENT ANXIETY

Andrea Roberts, Harold Goldsmith (Mentor), Psychology

Social Anxiety represents one of the most common disorders of adolescence. Research implicates genes involved in regulating the stress response and temperamental behavioral inhibition (BI) as potential vulnerability factors. Additionally, environmental risk factors, such as socioeconomic status (SES) may interact with other vulnerability factors to influence the development of Anxiety. The present study investigated the role of FKBP5, NPY, BI, and SES in predicting Social Anxiety in adolescence. Participants included 860 children and their caregivers from the Wisconsin Twin Project. We assessed BI via parent and observer ratings at age 7 and adolescent Social Anxiety symptoms through diagnostic interviews at age 13. This project aims to support BI as a temperamental vulnerability factor for Social Anxiety and demonstrate the importance of gene by environment interactions.

EFFECT OF MASKER TYPE AND SPATIAL RELEASE FROM MASKING ON YOUNG CHILDREN WITH NORMAL HEARING

Jennifer Rocheleau, Ruth Litovsky (Mentor), Communicative Disorders

This study will assess the speech reception thresholds (SRTs) of children with normal hearing (24-36 mo.) in quiet, with interferers presented at 90°, and with interferers at 0°. Interferers will be Harvard IEEE sentences spoken by a female adult and Child Centered (CC) sentences spoken by a female child. Children will repeat target words, and the sound level will increase or decrease until the 50% of the responses are correct, on average. SRTs will be measured at 0° and 90°. It is anticipated that trials in quiet will result in lower SRTs than those with interferers, trials with IEEE sentences will result in lower SRTs than those with CC sentences, and trials with interferers at 90° will result in lower SRTs than those at 0°.

BUILDING COMMUNITY IN SOUTHWEST MADISON

Ben Ruffolo, Laura Senier (Mentor), Community & Environmental Sociology

Madison has invested in neighborhood development in many districts around the city. Southwest Madison, however, has not yet been the focus of community development and community organizing initiatives. Responding to episodes of teen violence in 2009, the Mayor dispatched public health nurses to build community as a means of preventing youth violence. Over the past two years, neighbors and community leaders have organized a variety of activities directed at inter-neighbor interactions and community revitalization. By observing the community involvement and outcomes that these events generate, and creating detailed field notes, we can identify effective methods of improving the neighborhood internally, to help establish its long-term sustainability. This will offer strategies to other communities to decrease crime and violence, without involving law enforcement or correctional facilities.

DELETION OF GIDA AND GIDB GENES IN SALMONELLA ENTERICA SEROVAR TYPHIMURIUM

Imaan Saeed, Amin Fadl (Mentor), Animal Sciences

The objective of my research is to further characterize the role of *GidAB* operon in the pathogenesis of salmonella, with emphasis on their deletion. Salmonella is the most reported food-borne pathogen that causes salmonellosis, characterized by food poisoning, acute gastrointestinal inflammation, typhoid fever, and septicemia. *GidA* and *gidB* genes have been identified as important factors in regulatory mechanism of salmonella pathogenesis in in-vitro and in animal models. My research trials involve deleting the two genes from the bacterium, and testing the virulence of the pathogen under stressful environments. The long-term goal of our research is to develop weakened strains of Salmonella that could be used as live weakened vaccine to protect animals and ultimately humans against salmonellosis.

GENDER AND ACCOMMODATION

Sarah Saenz, Thomas Purnell (Mentor), English

This research seeks to understand the intersection of speaker familiarity, speech accommodation and women's speech behavior. Speakers accommodate their speech to others tempered by intra-speaker familiarity, such that male speakers who were familiar with each other accommodated less (Baugh 1988). Women's speech reflects highly sensitive knowledge, particularly to social or linguistic rules (Labov 2001). While women's speech is most non-standard among female peers, male-female conversations have demonstrated women accommodating towards males, speaker familiarity being unreported. Here, vowels from audio recordings of same-/different-gender pairs of speakers are analyzed with attention paid to changes in three females' speech. Speakers are very familiar with those they talk to (e.g., sister-sister, wife-husband), differing by dialect. The hypothesis that women always accommodate is contrasted with the role familiarity has in non-accommodation.

POLYUBIQUITIN FORMATION VIA THIOL-ENE CHEMISTRY

Nicholas Sanchez, Ellen Valkevich (Mentor), Chemistry

Ubiquitin is a post translational modification protein that is used by all eukaryotic cells for numerous cell functions. It functions through polymers of its c-terminus and one of seven lysine residues. We developed a method to synthesize polyubiquitin chains for laboratory use via thiol-ene chemistry. Our method involved the mutation of one lysine residue to a cysteine residue and a radical reaction with allylamine-ubiquitin to form a specifically linked ubiquitin dimer. All seven cysteine mutants successfully reacted with allylamine-ubiquitin to form a dimer. The formation of dimer is the first step to developing a reliable method to synthesize polyubiquitin chains of specific chain length and linkage and is key to better understand ubiquitin's function in eukaryotic cell processes.

PUBERTAL TIMING AND PARENT-ADOLESCENT RELATIONSHIP QUALITY AS PREDICTORS OF DISORDERED EATING

Sapir Sasson, Janet Hyde (Mentor), Psychology

The maturational deviance and stage-termination hypotheses state that early maturing adolescents are at increased risk for psychopathology. The present study investigated disordered eating as predicted by pubertal timing and moderated by parent-adolescent relationship quality. Adolescents rated themselves at ages 11, 13, and 15 for pubertal development and at age 15 reported quality of relationship with their mother and disordered eating symptoms. As expected, early maturing girls exhibited the most disordered eating symptoms, especially if the relationship with their mother was conflicted. Boys, on the other hand, reported the least disordered eating symptoms regardless of their pubertal timing or the quality of the relationship with their mother. The findings of this study have important implications for parents, teachers, and clinicians.

CHARACTERIZATION OF GNRH-GFP CELLS

Misa Sato, Ei Terasawa-Grilley (Mentor), Pediatrics

Gonadotropin-releasing hormone (GnRH) secreting neurons play a key role in reproductive function. However, the study of GnRH neurons in the hypothalamus is difficult, as they are few in number and have a scattered distribution pattern among other neurons and glia. Consequently, immortal cell lines have been created. The GnRH secreting GT1-7 cells, derived from transgenic tumors containing GnRH transcript in mice have been commonly used, but they are immature neurons. Recently, immortalized GnRH-GFP cells have been established from adult GnRH neurons, which express GFP by transgenic manipulation. This study characterizes the property of GnRH-GFP neurons. Results indicate that although GnRH-GFP neurons express neuronal phenotype and the GnRH protein, they do not exhibit calcium oscillations, like GT1-7 cells.

COMPARING AND CONTRASTING HOW CAR DEALERSHIPS ARE RUN UNDER DIFFERENT OWNERSHIP TYPES

Benjamin Saxon, Debra Holschuh-Houden (Mentor), Business Outreach

I will compare and contrast the specific advantages and disadvantages of public versus private family owned car dealerships. Surveys to multiple dealerships across the U.S. will include questions of opinion and fact pertaining to the management strategies in each dealership. I'll use news and research websites to examine topic. I have hypothesized one advantage to publically owned dealerships would be their ability to access liquid capital. An advantage to family owned dealerships would be their ability to maintain customers because of their family values. Car dealerships have been known to be family owned and that advantage helps their success compared to public dealerships.

QUANTIFYING THE EFFECTS OF UREA ON THE B' CLAMP AT T7A1 PROMOTER

Samantha Saykao, M Thomas Record (Mentor), Chemistry

In bacterial transcription initiation at lambdaPr (LPR) promoter, RNA polymerase (RNAP) binds to and opens the DNA start site, and then stabilizes the open complex by late steps in which mobile elements (B' clamp, jaw) assemble and tighten on downstream DNA, coupled to movements of the nontemplate strand in the active site cleft. The goal of my experiments is to characterize these late steps at T7A1 promoter, which forms a less stable open complex and initiates RNA synthesis much more rapidly. Dissociation kinetic experiments as a function of urea concentration will be used to test the hypothesis that the clamp or jaw is less tightly bound to T7A1, and chemical footprinting will be used to compare exposure of the nontemplate strand in the cleft.

ADHD MANAGEMENT IN SCHOOLS

Laura Scharenbroch, Lori Anderson (Mentor), Nursing

ADHD is one of the most common diagnoses that school nurses encounter. The purpose of this literature review was to determine what information about ADHD diagnosis, treatment, and management is available specific to school-based interventions. Several themes were identified: Importance of effective written care plans; necessity of continuous communication between health care providers, school, and home; and appropriate educational resources for children with ADHD and their parents is essential. More research should be done on behavioral interventions for use in schools, as well as guidelines for identifying and treating any co-existing conditions. Information from the literature review has been incorporated into a nursing reference application for iPad tablets that has been distributed to school nurses in rural southern Wisconsin.

SPEARHEAD TECHNOLOGY OF THE BRONZE AGE NEAR EAST: A COMPARATIVE ANALYSIS OF MOLD TYPES

Steve Schecher, Jonathan Kenoyer (Mentor), Anthropology

The production of metal alloys played an important role in manufacturing projectile points during the Near East Bronze Age. Therefore, this article will focus on ways to determine the methods used to produce these spearheads. More particularly, it will compare two types of bivalve molds. Is it possible to differentiate spears made from two different types of molds? If so, what are the differences in functional capabilities from the mold types? The results show that it is possible to differentiate between the two mold types, but further analysis is necessary to determine the differences in functional capabilities. This study demonstrates the importance of molding technology in the Near East and suggests better ways in which to document and research this topic in the future.

A MOLECULAR SYSTEMS BIOLOGY MODEL OF THE CIRCADIAN CLOCK IN DROSOPHILA

Kate Scheuer, Laurence Loewe (Mentor), Genetics

Circadian rhythms are biochemical pathways that generate a 24-hour cycle of rest and activity. *Drosophila melanogaster* is a model organism for studying circadian rhythms, as it is easier to study than more complex organisms. Computer simulations are a powerful tool for biological investigation, but they frequently require the encoding of models in formulations that are difficult to understand, especially to those without prior knowledge of computer science or mathematics. This study aims to contribute to developing a more user-friendly modeling syntax and to building on previous circadian rhythm simulations by incorporating recently discovered circadian proteins. The updated model will allow for more realistic simulations of *D. melanogaster* circadian rhythms, and the new syntax will increase the ease of creating similar models.

SEPARATING FAMILY AND BUSINESS

Mari Schlossmann, Ellie Feldman, Debra Holschuh-Houden (Mentor), Business Outreach

We will study the effects of working with family members and how it affects the success of the business. We will look at whether or not management in family businesses looks to treat family members similarly or differently than non-family employees and which method is most successful in the profitability and longevity of the family business. We believe that it is important to treat family members as regular employees because treating them differently could have a negative effect on the business. Through our research, we will see if treating each other like family or as a typical employee in a business affects their success. Our research will allow us to understand the best practices for families about how to manage their family business most effectively.

ILLNESS PERCEPTIONS PREDICT HEALTH PRACTICES FOLLOWING HEMATOPOIETIC STEM CELL TRANSPLANTATION

Kathryn Schmidt, Erin Costanzo (Mentor), Psychiatry

The present study investigated cancer patients' perceptions of their illness and the extent to which these common-sense beliefs affected health practices. Patients (N=274) undergoing stem cell transplantation for hematologic cancers completed measures of beliefs about the course, personal control, and consequences of their cancer pre-transplant and assessments of diet, exercise, alcohol use, and smoking 1 and 3 months post-transplant. Patients perceived their cancer to inflict moderate consequences upon their lives but believed they could control the disease through treatment and their own behaviors. Participants who perceived the consequences of their disease to be more severe reported better diet (beta=.179) and more exercise (beta=-.126) post-transplant, $p < .05$. Understanding patient's beliefs about their cancer could help guide efforts to encourage better health practices.

REQUIREMENT FOR B-CATENIN IN PROSTATIC BUD FORMATION

Christopher Schmitz, Chad Vezina (Mentor), Comparative Biosciences

The objective of this study was to test the hypothesis that β -catenin is required for formation of basal urothelium and prostatic buds in the fetal male mouse urogenital sinus (UGS). Two transgenic mouse models were used to delete β -catenin from UGS epithelium. Prostatic bud number, prostatic bud pattern, and markers of epithelial differentiation were evaluated in E18.5 and E17.5 male control and β -catenin loss-of-function mutant UGS. The *Ctnnb1lox/lox* genotype for the two transgenic models differed with respect to β -catenin protein expression pattern, number of prostatic buds, epithelial thickness, and presence of basal urothelium markers compared to controls. Thus, functional β -catenin protein expression in UGS epithelium appears to be necessary for development of basal urothelium and formation of prostate ductal buds.

FACEBOOK AND THE COLLEGE STUDENT: A STRESS CREATOR OR STRESS RELIEVER?

Shari Schoohs, Megan Moreno (Mentor), Pediatrics

College campuses are filled with stress, between maintaining high academic standings, struggling with adjustment to life on campus, and being away from family and friends. College campuses are also filled with Facebook, being that almost all college students have a Facebook profile. College students use Facebook for many things, but is it stressing them out, or relaxing them? We will ask college students ages 18 to 23 to fill out a questionnaire to assess this. Stress levels will be measured using the perceived stress scale (PSS). Students will also be asked to rate Facebook features as stress creating or stress relieving. The information gained from the survey will help create a better understanding of how Facebook is affecting college students.

ULTRASOUND SHOWS TONGUE SHAPES CHANGE FOR SAME VOWELS ACROSS DIFFERENT SPEECH STYLES

Tanner Schrank, Thomas Purnell (Mentor), English

Acoustic studies demonstrate that vernacular speech varies inversely by attention to speech units, primarily for vowels. Thus, vowel tongue shapes may change as speakers vary the use of their dialect and articulation speed. This project investigates how speech style affects speech physiology, where the biological component of articulation involves coordination of the tongue, mandible, velopharynx and lips. Since variationist linguistics is premised on the meaningfulness of observable heterogeneity, we should expect that the magnitude of movement would be slight. However, many gestures are possible for any one vowel. To test articulation consistency across style, synchronous ultrasound and audio recordings were made of the speakers' mouth-space. This study compares the lingual and mandible gestures of speakers' word list reading (standard data) with paragraph reading (vernacular data).

ROLE OF COLLAGEN SYNTHESIS IN VENTRICULAR AND VASCULAR ADAPTATION TO HYPOXIC PULMONARY HYPERTENSION

David Schreier, Naomi Chesler (Mentor), Biomedical Engineering

Hypoxic pulmonary hypertension causes vasoconstriction of distal arterioles in the lungs, leading to increased resistance to blood flow. Chronically, increased pulmonary artery pressure causes large extralobar pulmonary arteries (PA) to stiffen and become less compliant. Large PA stiffening is an excellent predictor of mortality in pulmonary hypertension, which is most often caused by right ventricular (RV) hypertrophy and failure. Previous work has demonstrated that collagen is a key contributor to PA stiffening. Therefore, we hypothesized that preventing new collagen synthesis during chronic hypoxia by administration of a proline analog would limit both hypertension and RV hypertrophy. We demonstrate with this study that limiting new collagen synthesis not only reduces pulmonary vascular remodeling but also may enhance RV adaptation to chronic hypoxia.

3-D SCAFFOLD FOR SCHWANN CELL MYELINATION IN-VITRO

David Schreier, Courtney Krueger, Jacob Meyer, Nicholas Shiley, John Svaren (Mentor), John Puccinelli (Mentor), Biomedical Engineering

Axon myelination of peripheral nerves is an essential biological process of human development that allows for proper signal communication between the brain and the periphery of the body. Currently there are no in vitro techniques available that accurately replicate the myelination process carried out by glial cells known as Schwann cells. A 3-D cell culture system designed for Schwann cells will allow them to fully myelinate synthetic microfilaments and may answer many questions about the process of myelination. This project intends to mimic the morphology and chemistry of peripheral nervous system (PNS) axons with polycaprolactone (PCL) fibers and neuregulin protein. The expression levels of myelin genes, such as PMP22, can thus be evaluated for drug screening studies against disorders such as Charcot-Marie-Tooth Type 1A.

SHEAR STRESS AND CYCLIC NUCLEOTIDES MODIFY POSTTRANSLATIONAL PHOSPHORYLATION OF Cx43-GAP JUNCTION AND eNOS PROTEINS IN UTERINE ARTERY ENDOTHELIAL CELLS DURING PREGNANCY

Ethan Schuler, Ronald Magness (Mentor), Obstetrics & Gynecology

During gestation uterine artery endothelial cell (UAEC) adaptations are dependent upon cell-cell communication via Gap junctions to increase uterine blood flow (UBF). The effects of shear stress and cyclic nucleotides on the associated phosphorylation state of the gap junction protein Cx43 and eNOS are unknown. We hypothesized that shear stress and cyclic nucleotides cAMP and cGMP will modify the “stimulatory” phosphorylation sites on Cx43 and eNOS. UAECs from pregnant ewes were exposed to physiologic levels of shear stress or exogenous treatment with 8-Bromo-cAMP/cGMP. Western blotting was performed to determine phosphorylation states of PKA dependent Ser P365Cx43, PKC dependent SerP368Cx43, and Ser P635 eNOS. We demonstrate that shear stress and exogenous cyclic nucleotides differentially stimulate PKA and

PKC dependent modifications of Cx43 phosphorylation in association with eNOS phosphorylation to maintain NO production and UBF.

FATTY ALCOHOL PRODUCTION IN ESCHERICHIA COLI FROM SIMPLE SUGARS

Martin Schumacher, Brian Pflieger (Mentor), Chemical and Biological Engineering

As fossil fuel prices rise, many are seeking an alternative. The metabolic pathways of Escherichia coli can be manipulated to produce dodecanol, a potential fuel. This is accomplished by exogenous feeding the cells simple sugars, which are then converted to fatty acids. Then, the fatty acids are used to produce fatty alcohols. Both alteration of E. coli chromosomal DNA and insertion of plasmids into the cells are used to optimize dodecanol production. In recent experiments, 5% of fatty acids were converted to desired product when fatty acids were produced internally, and 70% of fatty acids were converted to desired product when they were exogenously fed.

EXPRESSION OF THANATOS-ASSOCIATED PROTEIN DURING MOSQUITO GROWTH

Tyler Schwaegler, Que Lan (Mentor), Entomology

Our study in the Department of Entomology has discovered the transcription factor Thanatos-associated Protein (THAP) that plays a role in the growth of the Yellow Fever mosquito. This regulates growth partially by controlling the expression of the gene AeSCP-2. The study looks at how different levels of THAP affect the mosquito's growth rate in the larval stage. The differences in THAP expression profiles in different parts of the body are also evaluated and compared, which includes the outer carcass, midgut, and head. THAP expression is evaluated using gel electrophoresis, which DNA samples are retrieved for by reverse transcribing RNA. This study will help us to better understand the mosquito's molecular biology, as well as genes that are similar to THAP in other organisms.

CONFLICT AND DECISION MAKING UNDER SHARED LEADERSHIP IN A FAMILY OWNED BUSINESS

Alec Schwartz, Debra Holschuh-Houden (Mentor), Business Outreach

Family businesses often strive for long-term development, and as a business is passed down to younger generations, ownership and potential leadership decisions are shared with multiple family members. When this occurs, the fine lines between business and family can be uncertain. This project examines how three active leaders of an insurance agency, Schwartz Insurance, balance family and business relationships among each other. In its third generation, a father and two sons run the agency. This project also identifies this family business leadership setting as prone to conflict. Specifically, I demonstrate how the family roles and the personal values of each leader reinforce their decision-making processes, and why this often results in contrasting motives.

DEVELOPING COMMUNITY IN THE GARDEN: THE SPATIAL RELATIONSHIPS OF SOCIALIZATION

Kellie Schweich, Samuel Dennis (Mentor), Landscape Architecture

This thesis examines the social interactions of garden members in the Sheboygan Community Garden in Madison, WI. The study focuses specifically on spatial relationships in the garden as they relate to socialization. On-site behavioral observations were taken during each visit and interviews were conducted with 20 garden members. The study found a network of socialization in the garden often relating to the garden culture and education. Spatially, the gardeners circulated throughout the garden by way of the garden paths. This circulation pattern facilitates the socialization habits of the garden members. By understanding the social behaviors of the gardeners as they relate to the garden space and to each other we can better inform the design of community garden spaces to promote community growth.

ACCOUNTING FOR NITROGEN IN THE EXCHANGE COMPLEX OF GCL'S

Missy Setz, Sabrina Bradshaw (Mentor), Civil & Environmental Engineering

Bentonite clay is the main component of geosynthetic clay liners, which are used in engineered waste containment facilities. The exchange complex of bentonite is altered when solutions of different cations are introduced, altering clay hydraulic properties and potentially contaminating groundwater resources. Contaminants permeating through the bentonite can contain the nitrogen cation ammonium, which may constitute for a portion of the exchange complex. The current ASTM exchange complex standard uses ammonium acetate, masking bound ammonium in the exchange complex. Through alternate testing with a lithium bromide extraction solution, nitrogen concentrations in the bentonite clay have been measured. This study discusses the data analysis of this alternate extraction method and the relation of nitrogen presence to liner hydraulic performance.

ROLE OF TYROSINE 11 AS A SWITCH FOR THE INTERACTION BETWEEN BRAZZEIN AND THE HUMAN SWEET RECEPTOR

Minaliza Shahlapour, Fariba Assadi-Porter (Mentor), Biochemistry

Brazzein is the smallest, (54 amino acid residues) naturally sweet protein found in the fruit of the West African plant, *Pentadiplandra brazzeana*. Previous research using human taste panels concluded that brazzein is 500-2000 times sweeter than sucrose on a molar basis. Brazzein became a point of interest because it resembles carbohydrate sweeteners in taste quality, yet does not provide the same energy value as sucrose. In today's society, where the prevalence of obesity and diabetes is on the rise, non-calorigenic, natural sweeteners are very attractive. The demand for such a sweetener has brought our attention to the structure of brazzein on a molecular level and its interaction with the human taste receptor. Using site-directed mutagenesis, four brazzein mutants were produced: Y11A, Y11F, Y11I, and Y11T. They will be purified and evaluated based on their interaction with taste receptors. Using nuclear magnetic resonance (NMR)

spectroscopy, the three-dimensional structure of brazzein will be examined. This will provide further insight as to the specific regions involved in binding to the taste receptor. These properties can be applied to other brazzein mutants, as well as future artificial sweeteners.

INVOLVEMENT OF OSTEOCLASTOGENESIS IN ABDOMINAL AORTIC ANEURYSMS

Natsumi Shiotani, Dai Yamanouchi (Mentor), Surgery

Abdominal Aortic Aneurysms (AAA) are the thirteenth leading cause of death in the United States, so determining the involvement of osteoclastogenesis, the development of osteoclasts, is crucial to finding better treatment (Hinterseher). AAA's are dilation of the aortic wall, most often occurring in people over the age of sixty, which with time and continual growth can result in a rupture that increases the possibility of fatalities. (Lloyd-Jones). Osteoclast-like cells have been proven to affect arterial calcification, and have comparable components to AAAs, therefore the effect of osteoclasts is being explored (Yamanouchi, 2012). Three methods will be used to determine the involvement of osteoclastogenesis in abdominal aortic aneurysms in both humans and mice. Tissue samples will be collected from patients undergoing open repair AAA from the University of Wisconsin Hospital, a histological analysis will be performed and finally an immunohistochemistry as well (Yamanouchi, 2012).

RELATIVE HUMIDITY GREATER THAN 70% SIGNIFICANTLY INCREASES SCLEROTINIA HOMEOCARPA GROWTH

Jeanette Shultz, James Kerns (Mentor), Plant Pathology

Dollar spot, caused by the fungus *Sclerotinia homoeocarpa*, is a devastating disease of turfgrasses throughout the United States. More expenditures are required to control this dollar spot than any other turfgrass disease, yet, little research-based information exists detailing the conditions favoring disease development. This study seeks to determine the relationship between relative humidity and dollar spot development on 'Penncross' creeping bentgrass. Turfgrass inoculated with four isolates of *S. homoeocarpa* was grown at five different relative humidity percentages for two weeks. At the end of two weeks, disease severity was estimated using a point intersect method. Disease severity and fungal growth was substantial only when relative humidity eclipsed 70%. Based on this preliminary data, relative humidity is likely the main factor driving dollar spot development.

MILLIMETER-WAVE ROTATIONAL SPECTRUM OF PYRIDAZINE: A MOLECULE OF ASTROCHEMICAL INTEREST

Joshua Shutter, Brian Esselman, Brent Amberger, R. Claude Woods (Mentor), Robert McMahon (Mentor), Chemistry

Millimeter-wave spectroscopy, a type of rotational spectroscopy, has proven to be an effective method for detecting and identifying polar molecules in the interstellar medium (ISM). It is preferable to other methods because the rotational transitions provide a highly precise spectroscopic fingerprint which is useful for the radio astronomical detection of the polar species. Recent equipment and software upgrades to our millimeter-wave spectrometer have improved both its detection limit and efficiency. With this instrument, we have been able to determine the rotational spectrum of the ground state of pyridazine, whose aromaticity would make it remarkably stable in the ISM's ionizing environment, to within eight significant figures. We are also in the process of identifying and assigning the transitions of pyridazine's isotopomers and vibrationally-excited states.

WISCONSIN REGIONAL VARIATION IN /Æ/ PRODUCTION

Libby Siebrecht, Thomas Purnell (Mentor), English

Speakers of Wisconsin accents are identifiable against speakers of other distinct accents (New England, Southern). However, within the range of regional pronunciations, there remains rich linguistic variation. Also true of American English, the salient aspect of Wisconsin accents is vowels- particularly, in the word bat, which varies in different linguistic contexts. Accent research has discovered nuances in the pronunciation of this vowel nationally and regionally, thereby distinguishing Wisconsin from Minnesota and Illinois speakers; however, less is known of the extent that markers of Wisconsin's neighbors are used by speakers within Wisconsin. The present research investigates in-state variation (Eau Claire, Oconomowoc, Wausau), examining audio recordings of twelve female speakers of varying ages. Discussion of changing identities is situated within the context of dialect contact and change.

COMPUTER ACTIVITIES, PHYSICAL EXERCISE, AND MILD COGNITIVE IMPAIRMENT: A POPULATION-BASED STUDY

Taryn Silber, Cynthia Carlsson (Mentor), Medicine

Mild cognitive impairment (MCI) is an intermediate stage between the cognitive changes of normal aging and dementia. Subjects with MCI develop dementia at a rate of 10% to 15% per year as compared with 1% to 2% per year in the general population. Therefore, it is critical to identify potential protective factors against MCI. We used the Mayo Clinic Study of Aging population-based database to examine the combined effects of physical exercise and computer activities on the odds of having MCI, after accounting for caloric intake and traditional confounders. We found a significant additive interaction between moderate physical exercise and computer use (OR [95% CI], 0.36 [0.20-0.68]; P=.01). Therefore, the combination of physical exercise and computer use was associated with decreased odds of having MCI.

SPINAL CORD INJURY: OBESE INPATIENTS

Vincent Sirocchi, Tommy Yu (Mentor), Orthopedics and Rehabilitation

Obesity is an epidemic in the United States. It is even more challenging for obese patients with new disabilities to progress in physical rehabilitation. This research project involved retrospective review of medical records in acute inpatient rehabilitation at the University of Wisconsin hospital. Patients are classified into various groups according to their BMI (Body mass index), and their rehabilitation outcomes are analyzed using length of stay and FIM scores (Functional Independence Measures). FIM is a scale that focuses on the burden of care by assessing the patient's physical and cognitive disability. The purpose of this research is to find a relationship of patients' BMI with functional gain and length of stay in rehabilitation centers. Within the year, this research hopes to find the impact of obesity to rehabilitation progress.

EFFECTS OF GESTATIONAL IRON DEFICIENCY ON KIDNEY DEVELOPMENT THROUGH THE EVALUATION OF NEPHROGENESIS

Zachary Smith, Pamela Kling (Mentor), Pediatrics

BACKGROUND: Iron is essential for normal fetal development. Without sufficient iron, fetal growth retardation is seen. **OBJECTIVE:** This research experiment manipulates iron status of the mother and analyzes kidney development in her offspring. **METHODS:** Iron deficient (ID) rat pups are compared with the controlled iron sufficient (IS). We analyzed blood markers of iron status and studied photomicrographs of the active zone of kidney differentiation in the pups. **RESULTS:** After birth, pups are small and anemic with 40% lower hemoglobin ($p < 0.001$) and 3.5-fold higher zinc protoporphyrin (supporting ID as the cause of anemia) ($P < 0.001$). Nephrogenesis continues past the normal day of cessation. **CONCLUSION:** In ID, growth and kidney abnormalities are seen, emphasizing the importance of detecting and treating ID in pregnancy on outcomes of offspring.

INCREASED APOPTOSIS UNDERLIES IMPROVED OUTCOMES IN HPV-POSITIVE HEAD AND NECK CANCERS

Molly Smith, Randall Kimple (Mentor), Human Oncology

To investigate molecular mechanisms underlying improved clinical outcomes in patients with human papillomavirus (HPV)-positive head and neck cancers compared to patients with tobacco and alcohol associated head and neck cancers. Radiation response was assessed by clonogenic survival assay. Cell cycle distribution and apoptosis were assessed by flow cytometry and caspase activation. Tumor growth delay was assessed using a xenograft model with HPV-positive head and neck cancer cells (93-VU-147T) treated with cisplatin, cetuximab, and/or radiation. The improved clinical outcomes for patients with HPV-positive head and neck cancer may be due to increased sensitivity to radiation. This appears to be related to both an enhanced G2 arrest and increased apoptosis following radiation.

THE FUNCTIONAL DISTRIBUTION OF 5-HT4 RECEPTORS IN RAT BRAIN

Nathaniel Snell, Mark Brownfield (Mentor), Comparative Biosciences

The 5-HT4 class of serotonin receptors is less well understood than many others, but is known to be involved in neuroendocrine and behavioral circuits, and is thought to have a role in modulating appetite, anxiety and mood. A better understanding of the function and distribution of 5-HT4 receptors could lead to improved drug therapy for a variety of mental illnesses. We investigated the distribution of the 5-HT4 receptor in the rat brain, using Fos staining induced by a specific agonist for 5-HT4 receptors to label brain regions expressing the receptor. Our results demonstrate the presence of 5-HT4 receptors in areas of rat brain corresponding to those in humans that are important to the mental functions previously mentioned.

SUBTERFUGE; A COLLABORATIVE RESEARCH PROCESS IN PSYCHOLOGY AND CREATIVE THINKING

Jordan Snider, Katherine Corby (Mentor), Dance

My goal in developing "Subterfuge" was to provoke an emotional response. I used the characteristics of schizophrenia to generate movement. Prior to my studio research I read academic articles and interviewed peers who knew someone with schizophrenia, realizing the characteristics of this disorder could be used to embody what someone with schizophrenia experiences. To create movement I gave my dancers prompts for improvisation such as "Move as if someone is controlling you." I took the material they created to choreograph phrases. By creating "Subterfuge" I was able to produce an empathetic response through the body and mind of both my dancers and the audience.

STYLESHUFFLER PROJECT

Pedro Soares, Phillip Kim (Mentor), Business

The purpose of this research is to acquire data to help publicize and expand the Styleshuffler brand. Styleshuffler is a recommendation software similar to Pandora, except the website makes suggestions on clothing apparels. The first stage of the project is primarily focused in finishing designing the website and testing it to determine its target audience. Then, the project evolves to gathering intelligence on which companies and customers would be interested in the services the website provides. Lastly, the project steers toward contacting possible businesses interested on Styleshuffler. By developing the website and the brand further we acquired a superior understanding on the possible markets for Styleshuffler. Additionally, researching and visiting businesses maximizes our awareness on what it is expected and how valuable Styleshuffler may become.

EFFECTS OF WATER DEPTH AND TUBER DENSITY ON SIBERIAN CRANE FEEDING PATTERNS ON POYANG LAKE

Dali Soh, Anna Pidgeon (Mentor), Forest & Wildlife Ecology

With an estimated population of about 4,000, the Siberian Crane (*Grus leucogeranus*) is the third least numerous and the only crane species designated as critically endangered in the world. This species is thought to depend on a genus of submerged aquatic plant, *Vallisneria*, as its main source of food at its major location. The purpose of the study was to identify how *Vallisneria* densities and water depths were associated with the Siberian Cranes' feeding patterns over a period of 4 years at Poyang Lake, Jiangxi Province in China. *Vallisneria* tuber densities and water depths were interpolated from field data using a Geographic Information System (GIS). The comparison of the number birds observed with tuber density and water depth indicated a strong relationship between feeding patterns and water depths. I found that that Siberian Crane habitat selection is largely influenced by food accessibility (water depth), which could be key for future conservation and management efforts of this endangered species. interpolated from field data collected, using a Geographic Information System (GIS). The comparison of the number birds observed with tuber density and water depth indicated a strong relationship between feeding patterns and water depths. It was found that that Siberian Crane habitat selection is largely influenced by food accessibility (water depth), which could be key for future conservation and management efforts of this endangered species.

ESFJ

Shelby Sonnenberg, Marlene Skog (Mentor), Dance

ESFJ is a contemporary solo that was created as a way to express personality traits and preferred movement qualities. I began this project by taking the Myers-Briggs Type Indicator test and discovered that I am an extroverted, sensing, feeling and judging individual. I researched what each of the categories meant and from that I found key words to inspire movement. The choreography travels to different areas in the space based on the placement of each category on the continuum chart. This solo was developed without musical accompaniment; however, a musician will be accompanying this solo when it is performed. Creating this solo generated a better understanding of myself as an individual as well as an artist.

LINGUISTIC DIFFERENCES BETWEEN LIES, DECEPTION BY OMISSION, AND TRUTH

Rachel Sossaman, Lyn Van Swol (Mentor), Communication Arts

This project studies the linguistic differences between participants when they are lying, deceiving by omission, and truth-telling by analyzing their interaction when they are asked to allocate an amount of money between themselves and a partner. Deceptiveness has an emotional and cognitive response that affects the behavior of the deceiver. This behavior is hypothesized to result in the Pinocchio effect, or the tendency of liars to provide more reasons and evidence to their partner in an attempt to reduce suspicion. Deceptive individuals may also use few first

person pronouns. By studying linguistic patterns, this research can further the understanding of the emotional and cognitive processes that occur in liars and can provide a way utilize linguistic patterns as a tool in truth detection.

EXERCISE STRESS IN A MYOSIN BINDING PROTEIN C KNOCKOUT MODEL OF HYPERTROPHIC CARDIOMYOPATHY

Alexander Spring, John Ralphe (Mentor), Pediatrics

Myosin binding protein C (cMyBP-C) mutations are implicated in half of all cases of familial hypertrophic cardiomyopathy (HCM). In the un-phosphorylated state, cMyBP-C attenuates the kinetics of cross-bridging within the cardiac sarcomere, thereby reducing stress at basal conditions and preserving normal heart function. The mouse knockout model missing both alleles experiences accelerated cross-bridging at all times, which leads to pathologic ventricular hypertrophy and heart failure. The purpose of this study was to determine the effects of aerobic exercise in both (-/-) and heterozygous (+/-) cMyBP-C knockout mice, in order to provide evidence for future physical activity recommendations in patients with HCM. We also hoped to induce a phenotype in the heterozygous mouse, which was reported previously to not differ from the wild-type at baseline conditions.

FIBER OPTIC FIBERS IN ENGINE ACCESS RING

Joe Sterken, Scott Sanders (Mentor), Mechanical Engineering

Our research is being used to determine the feasibility of a new design for an Engine Access Ring: two separable parts as opposed to old one-piece designs. Engine Access Rings are used for a variety of tests inside combustion engines to determine efficiencies of the engine and other properties of the gas inside the engine. This works by using fiber optic fibers to shoot lasers across an air gap that gas from the engine occupies. We are attempting to make setup of the Engine Access Ring, a very labor intensive and delicate process, easier and less time consuming. The new design we are working on only uses two sets of fiber optic fibers, but if this new design works, we will eventually make one with 30 fiber optic fibers.

ATTITUDE CHANGES TOWARD TOBACCO AND MARIJUANA IN STUDENTS' FIRST YEAR OF COLLEGE

Mara Stewart, Megan Moreno (Mentor), Pediatrics

Nearly one-third of students have tried tobacco and over one-third have tried marijuana before college. The purpose of this study was to understand how students' attitudes toward tobacco and marijuana shift after entering college. 339 participants from two universities were interviewed the summer before college and 109 had follow-up interviews during their first semester. Attitude was measured on a 1 to 5 scale with 5=most positive. Results showed that participants' attitudes towards tobacco did not change (1.4 to 1.6) but their attitudes towards marijuana became more positive (2.51 to 2.73). Overall, Wisconsin students had more positive attitudes towards both

substances (tobacco=1.13 marijuana=1.97) than Washington participants (tobacco=0.70 marijuana=1.83). These results suggest that students' attitudes towards marijuana change in college but their attitudes towards tobacco do not.

ON GARBAGE, BOOKS AND LITERACY: A PERUVIAN EXAMPLE IN THE CONTEXT OF THE UNITED STATES

Jennifer Stitgen, Ksenija Bilbija (Mentor), Spanish and Portuguese

This research investigated how to adjust Sarita Cartonera's LUMPA program to an elementary school context in the United States. With the lack of funding available in United State's schools, implementing a program like LUMPA would increase students' access to literacy. The researcher interviewed Tania Silva, Milagros Saldarriaga, and Jaime Vargas Luna about the program details. The researcher also interviewed Djurdja Trajkovic to learn about her adaptation of LUMPA at Lincoln Elementary School in Madison. Through her investigation, she found that the LUMPA program incorporated several activities in which students critically analyzed literature and learned the process of writing through creating their own cardboard book. The researcher adapted this information and designed a curriculum for first grade writers in which they create their own cardboard book.

UNDERSTANDING SPEECH IN NOISE WITH MISMATCHED FREQUENCY INFORMATION

Corey Stoelb, Ruth Litovsky (Mentor), Communicative Disorders

Due to several effects of binaural (two-ear) hearing, such as the ability to locate sound sources and better understand speech in noisy environments, many deaf individuals opt to receive two cochlear implants (CIs). However, the difficulty and small scale of the surgery can lead to the CIs to be implanted at different depths, which create a frequency mismatch between the two ears. Previous studies have shown that this mismatch negatively affects sound localization abilities and, in turn, affect speech understanding in noisy situations. This study investigates the affect of frequency mismatch on a listener's ability to understand speech in noise by simulating these effects in normal hearing individuals.

PLASMA CONCENTRATION OF P-SELECTIN IN ASTHMA PATIENTS OF RANGING SEVERITY OVER TIME

Ethan Stortz, Mats Johansson (Mentor), Biomolecular Chemistry

P-selectin, a protein that translocates to the cell surface upon activation of endothelial cells or platelets, is important in recruitment of eosinophils to the lung in asthma. Plasma P-selectin is a marker of endothelial and platelet activation. We examined plasma P-selectin concentrations longitudinally in patients participating in the Severe Asthma Research Program. We found a trend to higher P-selectin in patients with severe asthma compared to non-severe asthma ($p = 0.06$). Although there was greater variation over the 3-year period than a 14-week period, P-selectin

concentrations did not vary significantly over time. We will also present the results of analyses of possible correlations between P-selectin and clinical data, including measures of lung function, airway inflammation, and imaging data.

MODIFYING STUDY DESIGN TO DECREASE ATTRITION IN HUMAN SUBJECT INTERVENTIONAL STUDIES

Alex Strassman, James Davis (Mentor), Medicine

The purpose of this project is to determine how to decrease attrition rates in human subject interventional studies. Attrition, or the reduction in participants over the course of a study, can lead to increased study expenses, decreased statistical power, and poor generalizability of results. Two variations of a quit smoking study were used to analyze ways to reduce attrition. By allowing participants to choose a high or low intensity intervention and adding an extra meeting before officially enrolling participants, attrition rates were significantly reduced from 57.3% to 38.8%, $\chi^2(1, N = 188) = 6.35, p = .01$. Many of the techniques used can be applied to other interventional studies to reduce attrition rates, leading to higher confidence in study results and reducing the study cost.

THE DREZ EXPERIMENT: A STUDY OF NEURON REGENERATION

Joslyn Strebe, Bermans Iskandar (Mentor), Neurosurgery

Neuronal injury in the central nervous system (CNS) is not recoverable. In our laboratory, we found that folic acid enhances the ability of CNS neurons to regenerate axons and to recover function after injury in independent animal models. Others have found that chondroitinase improves neural regeneration by removing inhibition from the glial scar caused by the injury. The DREZ animal model is designed to simultaneously measure neuronal regeneration as well as neurological recovery in rats. The surgery consists of crushing the C5-T1 dorsal rootlets in the upper spinal cord, paralyzing the right forepaw. The rats are then divided into 4 experimental groups, receiving a combination of folic acid and chondroitinase. Over 42 days, we administer weekly behavioral tests, observing the paralyzed limb, then inject the rat with a tracer that measures new neuron growth. This will provide information on how effective the combination of chondroitinase and folic acid are in the recovery of otherwise permanent paralysis. Attaining motor function after injury is a pivotal step in curing paralysis.

ATSFH1 LIPID TRANSPORTER AFFECTS CA²⁺ SIGNALING, PROMOTING ROOT HAIR GROWTH OF ARABIDOPSIS THALIANA

Marta Studnicka, Simon Gilroy (Mentor), Botany

Plant's root hairs serve many important functions, including anchoring and increasing the surface area of the root to facilitate water and nutrient uptake. A root hair is an extension of a root epidermal cell. The epidermal cell initiates the hair by forming a bulge, which then extends into a hair via tip growth. Tip growth is a complicated process requiring synchronization of cellular

activities including lipid signaling and cytoplasmic calcium gradient. Previous results show that plants lacking AtSFH1, a phospholipid binding protein, can initiate root hairs, but not launch tip growth. In this study, we show that AtSFH1 is critical for normal root hair growth. Confocal microscopy will be used to compare the calcium gradient in the growing root hairs of wild type and mutants.

MANAGEMENT STYLES IN FAMILY BUSINESS

Robert Stutz, Debra Holschuh-Houden (Mentor), Business Outreach

This project is looking at the management styles of family businesses and how they differ among each other. Specifically, what are the advantages and disadvantages of being and competing as a family owned business. I will be looking into two competing family businesses in Madison: The Kollege Klub and State Street Brats. My research will include interviews and surveys of the two businesses' owners and employees. Since both of these businesses are multi-generational, I will also take note of how management styles change with succession. From this data I will find what sets family businesses apart; both what is beneficial and what is disadvantageous.

SPANISH-ENGLISH BILINGUALS' VARIABLE APPROACH TO SPANISH VERB ASPECT

Casey Sweeney, Catherine Stafford (Mentor), Spanish and Portuguese

Research in bilingual language acquisition extends our understanding of how different individuals acquire, and perhaps lose, certain language qualities as a result of both psycholinguistic and sociolinguistic circumstances. In this research project, I investigate the domain of verb tense and aspect among Spanish-English bilinguals. Volunteers (N=48) completed a reading task that assessed their knowledge of Spanish verbal aspect. Performance on the task is compared statistically and results suggest the extent to which more and less proficient bilinguals' complex rules of Spanish verb tense and aspect have undergone simplification due to English influence. We hypothesize that between-groups differences will emerge, but that the degree of difference will vary by the semantic and syntactic features of the Spanish aspectual system considered in the analyses.

EFFECT OF GRAMMATICALITY OF PARENT LANGUAGE INPUT ON LANGUAGE DEVELOPMENT IN CHILDREN WITH AUTISM

Madeleine Swenson, Susan Ellis Weismer (Mentor), Communicative Disorders

Understanding the relationship between parent language input and child language acquisition is a theoretically and clinically relevant question. This study explored the relationship between the grammaticality of parent language input and language development in 32 toddlers with autism spectrum disorders. Parent language (ungrammatical speech) and child language (grammatical complexity and lexical diversity) were coded from 15-minute parent-child play samples collected when the toddlers were 32 months old. A negative association was identified between

ungrammatical parent input and children's grammatical complexity ($r=-.37$, $p < .04$), but not with lexical diversity ($p=.57$). A trend was identified between ungrammatical parent input and children's expressive language on a standardized measure ($r=-.33$, $p=.066$). These findings suggest that parents and clinicians should consider the grammaticality of simplified language input that children receive.

DETERMINATION OF GENETIC INTERACTION BETWEEN FIFE AND CANDIDATE PROTEINS IN DROSOPHILA MELANOGASTER

Erin Tapper, Elizabeth Roeske, Kathaleen Oconnor-Giles (Mentor), Genetics

The goal of the research is to identify proteins that function with Fife in the active zones of neural synapses of *Drosophila melanogaster*. Reduction of Fife is known to cause abnormal synapse formation. Protein candidates are chosen based on other known synaptic proteins as well as protein known to bind Piccolo, the vertebrate homologue of Fife. Selected candidates will be knocked down simultaneously with Fife. Analysis of markers in the synaptic imaging of larval neurons acquired with the use of a confocal microscope will provide evidence of atypical synapse formation. Results will indicate genetic interaction between Fife and candidate proteins.

THE ROLE OF HUMAN CYTOMEGALOVIRUS MIRNAS IN REGULATION OF FRMD6

Kathryn Taylor, Rebecca Tirabassi (Mentor), Medical Microbiology

Human Cytomegalovirus (HCMV) is a double stranded DNA virus that is widespread in the population. Once contracted, HCMV lies dormant in the body and is especially harmful for immunosuppressed individuals as well as expectant mothers as it is one of the leading infectious causes of congenital birth defects. HCMV encodes 22 microRNAs (miRNAs) that act to downregulate gene expression after RNA transcription. The impact of virally encoded miRNAs in pathogenesis has not fully been discovered. We have determined that the HCMV miRNA, miR-US5-2 targets FRMD6, a protein that contains an actin binding domain and colocalizes with actin. The study of miR-US5-2 regulation of FRMD6 will allow me to gather more information on the impact of actin regulation on HCMV pathogenesis.

GUIDEBOOK TO BYZANTINE HISTORIOGRAPHY

Colin Terwelp, Leonora Neville (Mentor), History

Byzantine historiography, relative to histories of other celebrated empires, is disorganized and difficult to research. Our project addresses this problem by designing a three-part guidebook highlighting 51 dominant historians and works from medieval Greece (approximately 500 A.D. - 1400 A.D.). The introduction includes a bibliography of additional texts and sources available for further research. An entry segment for each work or historian then presents background facts relating to specific areas of dispute, such as "date of composition" or "manuscript history". Lastly, the guidebook provides exhaustive chronologies on individual works, probable author life spans,

and emperor lists for additional details and comprehension. Through this research, Byzantine historiography will be more accessible to the scholarly world, promoting new growth for the history as a whole.

DETERMINANTS OF DISEASE-RELATED INDIVIDUALIZED QUALITY OF LIFE IN HEART FAILURE

Mai Thao, Beth Fahlberg (Mentor), Nursing

Heart failure (HF) is a chronic disease that affects over 5 million Americans and has a mortality rate of 42.3% within 5 years of diagnosis. Previous research has shown that HF impacts every domain of quality of life (QOL). While symptoms such as dyspnea, functional impairment and depression are routinely assessed in care for these patients, other issues that impact QOL may not be adequately identified and treated. Therefore, a more comprehensive description of QOL in HF is needed that will promote holistic assessment and intervention. The purpose of this research was to describe QOL in HF based on determinants of disease-related individualized QOL. Ferrell's Palliative Care QOL Model was used as a conceptual framework, consisting of four domains that influence QOL: physical, psychological, social, and spiritual. This model provides an organizing structure to understand HF experiences that impact QOL in this population. The Schedule for the Evaluation of Individualized Quality of Life-Disease Related (SEIQOL-DR) adapted for HF was administered as a structured interview. This tool asks participants to describe and rate the determinants of QOL most impacted by their heart problems. Structured content analysis was conducted in Excel, placing the determinants into one of Ferrell's domains, and then into a sub-category that had previously been identified through literature review. Although most determinants fit into the original sub-categories, some could not. Nine new sub-categories were created for this data. 47 individuals with HF participated in this study, with a mean age of 75.9 years (SD 7.6, range 64-91). The most frequently reported determinants were functional ability (physical), healthcare maintenance/self-care challenges (social), and fatigue (physical). This study described issues associated with HF that impacted each dimension of QOL. This information will allow practitioners to better understand and promote QOL in individuals with HF.

GENERATION OF EPHRIN GRADIENTS WITHIN A POLY(ETHYLENE GLYCOL) MATRIX VIA PHOTOINCORPORATION

Jeffrey Theisen, Thomas Keenan (Mentor), Biomedical Engineering

Synthetic hydrogels are widely used for biomaterial applications. To better direct cell growth in synthetic hydrogels, it is desirable to precisely engineer the microenvironment. For example, incorporation of signaling molecules or variation of stiffness can affect cellular behavior. Along these lines, this project seeks to incorporate a gradient of Ephrins, signaling molecules known to have a concentration gradient in neural tissue, within a poly(ethylene glycol) hydrogel via photoincorporation. Already we have optimized hydrogel parameters to allow for easy Ephrin incorporation. Further work will examine the diffusivity within the matrix and will generate a gradient of Ephrins via variation of either UV exposure or Ephrin concentration during

photoincorporation. Additionally, the incorporation of signaling molecule gradients may be widely applicable for emulating other cell-cell signaling pathways.

EXTRACELLULAR MATRIX PROTEINS DURING STEM CELL DIFFERENTIATION

Terra Thimm, Jayne Squirrel (Mentor), Biomedical Engineering

One application of stem cell research is the development of medical cell-based therapies such as regeneration of damaged heart tissue. This application would benefit from a better understanding of the interplay between stem cell differentiation and the expression of extracellular matrix (ECM) proteins. The goal of this project was to identify the presence and location of three ECM proteins - type I collagen, elastin, and type IV collagen - in developing mouse embryoid bodies (EB). Using immunocytochemistry, type I collagen was found present at the middle stages of differentiation, elastin at the early stages, and type IV collagen at the late stages. This variation in protein expression at different timepoints suggests which combination of ECM proteins may best support stem cells for repairing damaged heart tissue.

FAMILY OWNED CRAFT BREWERIES AND THEIR COMPETITIVE ADVANTAGE OVER LARGE BREWERIES

Charles Thio, Debra Holschuh-Houden (Mentor), Business Outreach

There are a total of 1,759 breweries in the United States of America, 1,716 of which are classified as Craft Breweries. Craft breweries are breweries that are independent and produce less than 6 million barrels of beer per year. In 2010, the beer industry had estimated sales of \$101 billion. However, the craft beer industry only accounted for \$7.6 billion of sales. The most popular beers are from the large breweries such as MillerCoors and Anheuser-Busch. Despite this, the number of craft breweries opening every year is increasing. By conducting surveys, interviews and using industry knowledge, this project will research on how smaller craft and family-owned breweries stay competitive against the large breweries and thus highlight the differences between craft breweries and large breweries.

DOES PANDEMIC FLU DETER FROM OTHER CONVENTIONAL VIRUSES IN INDUCING TYPE I INTERFERON

Julia Thorson, Suresh Marulasiddappa (Mentor), Cellular and Molecular Pathology

The production of type I interferons (IFN) is the first line of defense against viral infections. The type I IFN mediated defense is a highly conserved anti-viral pathway across the phylogenetic ladder. Not surprisingly, many viruses have developed strategies to antagonize the induction of the anti-viral effect of type I IFNs. In this experiment, we will investigate how pandemic influenza viruses differ from conventional viruses in inducing type I IFNs (alpha and beta) across several time points post-infection. Quantitative real time PCR (RT-PCR) will be utilized to quantify IFN alpha and beta RNA from cells infected with three different pandemic influenza H1N1 strains as well as lymphocytic choriomeningitis virus (LCMV) and vaccinia virus (VV). We

hypothesize that the pandemic influenza viruses will be more efficient at inhibiting the production of IFN alpha and beta than the non-pandemic influenza virus strains. Experiments are currently in progress to test this hypothesis. Research in this area would further the understanding of viral defenses and INF function.

THE PURSUIT OF HAPPINESS

Jasmine Timmons, Jenell Johnson (Mentor), Communication Arts

Conducted by an African American woman, this study investigates a possible avenue to achieving the pursuit of happiness, using the CEO formula, which I have created to reflect the role of choices, experiences, and opportunities in individual happiness. The research draws on narratives, interviews from the Madison community, and analyzes scholars, from John Locke to Angela Davis, all whom contributed to the conversation of what it means to be happy. This study is driven by the motivation to provide youth with a sense of hope, to live a fulfilling and obtainable life. The information collected will ultimately be used to start a program for young black girls, to cast aside the racial and gendered stigmas and follow and believe in their individual goals and dreams.

YOGA THAT DEFIES GRAVITY

Jamie Tolmatsky, Gudrun Buhnemann (Mentor), Languages and Cultures of Asia

Antigravity Aerial Yoga is a relatively new style of yoga that utilizes acrobatics, gymnastics, and dance movements on a silk hammock as a means to amplify the impact of a typical yoga workout. Created in 2007 by Christopher Harrison, this style of yoga is a fad sweeping metropolitan areas across the country. The purpose of this presentation is to explore the special features of AntiGravity Yoga that set it apart from other styles of yoga. I further seek to assess the legitimacy of AntiGravity Yoga by comparing it to other forms of modern postural yoga and to the aims of Hindu yoga in ancient India.

BACTERIAL VELOCITY IN VISCOUS FLUIDS: WHY DO SWARMER CELLS OUTSWIM VEGETATIVE CELLS?

Sonia Trevino-Dopatka, Douglas Weibel (Mentor), Biochemistry

In response to physical or chemical environmental stimuli, many bacteria differentiate from short (~5 μm) vegetative cells with a low density of flagella to highly virulent elongated (~10-50 μm) swarmer cells with dramatically increased flagellar density. We hypothesized that in viscous environments, such as mucous secreted by the primary epithelium, increased flagellar density conveys a motility advantage for swarmer cells as compared to vegetative cells. To test this, we quantified and compared cell motility of several morphologies of WT *P. mirabilis* HI4320 in fluids of varying viscosity (1, 9, 77, 830, and 8340 cP). We found that swarmer cells are significantly faster than other cell types in ≥ 9 cP viscosity fluids and remain motile at 8340 cP viscosity, where all other cell types lose motility.

VOCAL FOLD RESEARCH

Tenzin Tsegyal, Nathan Welham (Mentor), Surgery

Our research includes the search of a safe and appropriate alternative treatment or cure to patients who suffer from vocal fold damage. Vocal fold damage constrains the patients the use of their voice, as well as causing great discomfort. With tissue engineering, these cells are replicated in hopes that they will grow and function just the same. With simple blood samples, the cellular levels of the vocal fold tissue are grown entirely new. This is made possible with appropriate conditions and factors such as biomaterials and growth factors. These new tissues are then cut into dimensions suitable for slides, stained, and examined. The *ex vivo* vocal folds are scanned to compare with the *in vitro* vocal folds. At the current moment there is no concrete conclusion, we continue to study the vocal fold tissue and cells, both at its cellular and tissue level. Success of these trials can lead to great convenience and care for patients who suffer from damaged vocal folds. Many patients who suffer from throat cancer or who have experienced damage in the larynx can look forward to the conclusion of this study.

EFFECT OF BETA-FGF (BETA-FIBROBLAST GF) ON HUMAN EMBRYONIC STEM CELL-DERIVED MUSCLE PROGENITOR CELLS

Chak Foon Tso, Masatoshi Suzuki (Mentor), Comparative Biosciences

ALS (Amyotrophic Lateral Sclerosis, or Lou Gehrig's Disease) is a fatal neurodegenerative disorder manifested through the deterioration of both upper and lower motor neurons. Our group has investigated the efficacy of stem cell grafts that produced and secrete growth factors targeting skeletal muscles in rat model of ALS. Previously we have successfully derived skeletal muscle progenitor cells (SPMCs) from both embryonic stem cell. Research has showed that decreased bFGF concentration in culture medium stimulates the proliferation of muscle progenitor cells. Previous *in vitro* result by RT-PCR shown that after 14 days deprivation of bFGF less cells end up to mature skeletal muscles, i.e. more of them are still SPMCs. We now question whether this will persist after transplantation to rat skeletal muscle.

PREECLAMPSIA: HYPERTENSION IN PREGNANT WOMEN

Iboro Udomon, Dinesh Shah (Mentor), Cynthia Bird (Mentor), Obstetrics & Gynecology

Preeclampsia is a dangerous condition that occurs during pregnancy. It is characterized by high blood pressure which is a major factor in causing maternal and fetal deaths. Preeclampsia is only remedied by delivery of the baby and its cause is unknown. The Renin-Angiotensin System (RAS) may be responsible for preeclampsia. To determine this, we study the blood vessels of preeclamptic mice. Mating transgenic female mice expressing angiotensinogen with transgenic male mice expressing renin leads to hypertension in later stages of the mice's pregnancy. The purpose of this research is to investigate vascular reactivity in order to understand on a fundamental vascular basis why/how high blood pressure occurs in these mice. We hope to apply this knowledge about vascular dysfunction to human investigations in the future.

ROLE OF NKCC1 AND MMP2 IN NEUROPATHIC PAIN FOLLOWING SPINAL CORD INJURY

Jeanet Ugalde, Gurwattan Miranpuri (Mentor), Neurological Surgery

Identification of specific molecular pathways in spinal cord injury neuropathic pain (SCINP) has become a major priority. We have investigated the role of Na-K-Cl cotransporter (NKCC1) in the development of SCINP using spinal cord injured rat model. We hypothesize that SCINP will cause up-regulation of NKCC1 and a corresponding increase in gene expression and protein levels of matrix metalloproteinases (MMPs), the proteinases playing a central role in many biological processes. Three hypotheses i) MMP-2 enables the development of hyperalgesia; ii) NKCC1 mediates inflammatory cytokine expression in animals exhibiting increased pain; iii) correlation of NKCC1 and MMP2 activity during pain via the MAPK pathway. We will examine the effects of NKCC1 inhibitor bumetanide on MMP2 activation which is a promising therapeutic agent involved in treating SCINP.

THE GREATEST EXPERIMENT: AMERICAN EMIGRANTS AND THE SOVIET UNION

Paula Uniacke, Francine Hirsch (Mentor), History

The purpose of this research is to identify the key motivations of Americans who emigrated to the Soviet Union during the early 1930s. Drawing mainly upon memoirs of Americans emigrants, this research also depends upon news and opinion articles featured in mainstream and left-leaning periodicals during period. The goal is to show that, instead of being motivated purely by economic desperation or Communist ideology, their enthusiasm stemmed from a more nuanced combination of desires: to help build an egalitarian workers' paradise, to find productive employment, and to be part of a historic adventure. This project attempts to overcome some of the post-Cold War stigmas and assumptions associated with those Americans who moved to join the "great Soviet experiment."

ANTI-CD40 mAB AND MONOPHOSPHORYL LIPID A SYNERGIZE AT LOW INTRATUMORAL DOSES TO MEDIATE T CELL-INDEPENDENT ANTITUMOR EFFECTS AGAINST LOCAL AND DISTANT TUMORS

Tyler Van De Voort, Alexander Rakhmilevich (Mentor), Human Oncology

Combination immunotherapies are promising treatments for cancer patients. In this study, monophosphoryl lipid A (MPL), a nontoxic derivative of LPS and agonist of toll-like receptor 4 (TLR4), was tested in combination with an agonistic anti-CD40 monoclonal antibody to assess the antitumor synergy between the two agents. We show that anti-CD40 is capable of priming CD11b+ Gr-1+/- macrophages (M ϕ) to subsequent ex vivo activation by MPL. These in vitro antitumor effects were reproduced in SCID mice and in T cell-depleted C57BL/6 mice. Intraperitoneal injections of anti-CD40+MPL induced additive to synergistic suppression of B16-F10 melanoma tumors growing subcutaneously. When anti-CD40+MPL were injected directly

into the subcutaneous tumor, the combination treatment was still effective, even with a 25-fold reduction in dose. Low-dose intratumoral treatment also slowed the growth of a secondary tumor growing simultaneously at a distant, untreated site. These antitumor effects were reproduced in immunodeficient SCID mice and in T cell-depleted C57BL/6 mice, ruling out a role for T-cells as the most important effector cells for intratumoral treatment. Taken together, our results show that the antitumor effects of anti-CD40 mAb are synergistically enhanced by subsequent treatment with MPL, even in T cell-deficient hosts. This provides evidence that anti-CD40+MPL is a clinically-promising combination immunotherapy for immunosuppressed cancer patients.

INVESTIGATING TITANIA AS AN ELECTRON ACCEPTOR IN CARBON NANOTUBE PHOTOVOLTAICS

Chris VanBrocklin, Michael Arnold (Mentor), Materials Science & Engineering

Carbon nanotube photovoltaics offer a large potential for harvesting solar energy, but are hindered by low exciton diffusion lengths. Titania may offer the correct energy levels to allow for increased exciton dissociation. Titania films layered on carbon nanotubes could lead to greater efficiencies and superior performance for these organic photovoltaics. Anatase titania was synthesized and spin-coated on Indium Tin Oxide. So far we have achieved very flat, uniform layers of titania. Carbon nanotubes will then be doctor-bladed onto these films. This will form an inverted solar cell architecture, which will be tested to determine if the titania is providing an effective interface to dissociate excitons. A properly functioning titania layer would dissociate more excitons, leading to larger currents and greater efficiencies.

COMPARISON OF 2 APPROACHES TO GENETIC COUNSELING: TAILORED FAMILY-CENTERED & USUAL APPROACH

Rabeea Vanevenhoven-Shaheen, Audrey Tluczek (Mentor), Nursing

This project was part of a larger study that examined the feasibility and initial efficacy of a tailored family-centered model of genetic counseling in comparison to the usual approach. This included identification, documentation, and comparison of specific topics discussed during counseling sessions. Directed and summative content analyses were conducted on 15 de-identified transcripts of genetic counseling sessions with parents of infants with a positive NBS for CF. The content analysis identified 91 topics. Descriptive and non-parametric statistics will be used to evaluate difference between the two counseling models. Preliminary review of data suggests differences based on counseling models. Findings may help clinicians improve patient-provider communication and inform future research.

SYMBIOTIC MICROFLORA OF EURYTEMORA AFFINIS

Khamsai Vang, Martin Bontrager (Mentor), Genetics

Recent studies of animal gut microbes suggest that many vital functions of the host organism depend heavily on the bacterial colonies which reside in their digestive tract. The copepod *Eurytemora affinis* has successfully invaded freshwater habitats from saline sources on multiple independent occasions. This advantage may be provided by its gut bacteria. In this study, we will attempt to isolate and identify the resident bacteria present in and on *E. affinis*. We will process individual organisms and culture all the resulting bacteria on nutrient enriched agar plates and broth. We will extract samples from isolated colonies, and identify them by sequencing and comparing their 16s ribosomal DNA to known bacteria. From this, we hope to identify potentially symbiotic bacteria and their role in habitat transition.

THE ULTIMATE GAME THEORY: MONETARY NEGOTIATION

Lisa Vang, Lyn Van Swol (Mentor), Communications

This study focuses on the linguistic differences based on monetary offer type: lie, truth, and omission. Participants are randomly assigned as Allocators or Recipients. Allocators are given an amount of money to divide between themselves and the Recipients. Recipients do not know how much Allocators were given; allowing Allocators to deceive. In condition one, Allocators are given an extra dollar, giving them a motive to omit this extra information. Allocators can make the offer via face-to-face or computer chat. Recipients must accept or reject the offer. If accepted, each receives the agreed amount. If rejected, Recipients receive a default amount while Allocators receive nothing. The results and analysis of this experiment will contribute to understanding to speech patterns of liars and truth-tellers.

INVESTIGATING IMPLICIT GENDER BIAS IN THE NIH'S PEER REVIEW PROCESS OF RESEARCH PROGRAM GRANTS

Erika Vassar-Olsen, Mary Carnes (Mentor), Medicine

Obtaining a research program (R01) grant from the National Institutes of Health (NIH) is a significant determinant of career advancement for academicians in medical research. Receipt of an R01 or an equivalent award provides scientists with funding to grow their research programs; simultaneously allowing them to contribute to the nation's health agenda while becoming leaders in their respective fields. Prior research shows that women demonstrate lower success in obtaining R01s than men. Reasons for this disparity remain unidentified. This proposal includes background information on the importance of female leaders in academic medicine, the predicament of the gender imbalance in the allotment of R01 grants, and the methods we will use to investigate possible implicit gender bias in the NIH's grant review process, disadvantaging female applicants.

GENDER DETERMINATION OF TWO-TOED SLOTHS (CHOLOEPUS HOFFMANNI) WITH THE SRY GENE

Cristina Vaughan, Jonathan Pauli (Mentor), Forest & Wildlife Ecology

It is difficult to identify the sex of juvenile two-toed sloths (*Choloepus hoffmanni*) due to genitalia that are not fully developed. To aid field biologists in collecting demographic information on this species of conservation concern, we developed a modified polymerase chain reaction (PCR) amplification of a Y chromosome-linked gene, the sex-determining region Y (SRY), to determine the sex of individual sloths. Mature sloths of known sexes were used to test a previously developed SRY amplification routine and optimize the technique. When electrophoresed on an agarose gel, the amplified SRY region was visualized at 466bp when the sloth was male. If the sloth was female, no band was detected. Testing was performed on 47 adult sloths of known sex (22 male and 25 female), which resulted in a 6.9% error rate. Of the 35 unknown juveniles tested, 20 were male and 15 were female. The ability to identify sex of juvenile sloths will aid researchers by providing them with more detailed information about the two-toed sloths which can in turn aid in answering questions of population ecology that require an understanding of sex ratios.

IMPROVING THE DOCTOR- PATIENT RELATIONSHIP AT HCI LAB

Stephen Vey Jr., Onur Asan (Mentor), Industrial Engineering

A good doctor-patient relationship in today's world is very important to have. In my research project, I am a coder of recorded videos of a doctor and patient interaction. In coding these videos, I only get down where the doctor and patient are looking at all times in their meeting. I do this because eye contact is the most powerful mode of establishing communication between humans. The coding then goes through a sequential analysis of eye gaze patterns to see how a doctor's gaze influences a patient and vice versa. This influence of a doctor to a patient determines the patient's trust and satisfaction towards that doctor. The results of this research could lead to new health information technologies that would improve the doctor-patient relationship.

MASS MEDIA VERSUS CITIZEN JOURNALISM: A DAVID AND GOLIATH BATTLE

Joshua Villanueva, Bryan McLaughlin (Mentor), Mass Communication

Sexual scandals are becoming more frequent in today's political scene, and more people are taking it upon themselves to access the news using various forms of social media. We sent two emails containing links to videos that informed participants of a made up sexual scandal committed by a political candidate. The first email's video, hosted by a news station where a reporter is broadcasting this story, while the second is told by a citizen journalist reporting from home. Both scenarios relay the same information about the candidate using the same actor. Our group wants to find out how vital of a role media plays in today's political landscape and the methods of how people find out about political scandals.

THE RURAL HEALTHCARE PROVIDER: BARRIERS AND BENEFITS TO THEIR PRACTICE

Hope Villiard, Megan Moreno (Mentor), Pediatrics

Healthcare providers may face unique barriers and limitations when treating patients in a rural setting. The purpose of this project was to 1) identify what attracts healthcare providers to a rural area, 2) recognize the limitations that rural physicians face in their daily practice, 3) determine the pathways addressing the obesity problem in rural areas, and 4) investigate the needs for future research to bridge the gap between rural providers and tertiary centers. One-on-one interviews with rural healthcare providers were conducted between September 2011 and March 2012. Audio tapes of each interview were transcribed. The current status of this project is completion of 8 interviews which have been transcribed, and analysis will be completed by the time of the URS.

SOCIAL SUPPORT PREDICTS MENTAL HEALTH AMONG CANCER PATIENTS UNDERGOING STEM CELL TRANSPLANTATION

Savitri Viozat, Erin Costanzo (Mentor), Psychiatry

This study examined the relationship between social support and mental health during recovery from hematopoietic stem cell transplant (HSCT). Cancer patients undergoing HSCT (N=311) completed measures of dimensions of social support, depression, anxiety, and psychological well-being prior to transplant and at 1, 3, and 6 months post-transplant. Hierarchical multiple regression models indicated that higher levels of social integration and attachment pre-transplant predicted less anxiety pre-transplant and at 1 month post-transplant (betas range from -.139 to -.116, $p < .05$). Better pre-transplant social integration and attachment also predicted greater psychological well-being pre-transplant and 3 and 6 months post-transplant (betas range from .130 to .240, $p < .05$). Results suggest that perceptions of support are pivotal to HSCT recipients' psychological well-being and may play an important role in their quality-of-life.

TARGETING SSX TO ALTER GVHD AND GVL RESPONSE IN LEUKEMIA PATIENTS

Kaitlyn Voelz, Katelyn Goodman, Christian Capitini (Mentor), Pediatrics

Leukemia is the most common type of childhood cancer. Bone marrow transplant is used to treat very high risk or refractory leukemias through a graft versus leukemia (GVL) effect. Graft versus host disease (GVHD) can be a major, or in some cases fatal, complication where the donor T cells in the graft attack the recipient's tissues. The goal of the Capitini Lab is to minimize GvHD while still promoting a GvL response. We propose using a dendritic cell vaccine targeted toward the cancer-testis antigen SSX, which is aberrantly expressed on tumors. Skewing the donor T cells with a vaccine may increase GVL and reduce GVHD.

IMPLICATIONS OF BODY IMAGE AND FACEBOOK

Leah Wachowski, Megan Moreno (Mentor), Pediatrics

Body image of adolescents has been studied because of its implications on overall health, psychological and sociocultural factors. There is little research about how social networking sites affect body image. The purpose of this study was to investigate how Facebook and body image are related. 30 female college students participated in focus groups consisting of questions about the association between body image and Facebook as well as the impact of age, gender, and advertisements. Participants thought Facebook could impact body image negatively or positively on an individual basis, younger adolescents would be affected more, associated body image on Facebook with females, saw traditional gender roles in advertising and that people with a negative body image inhibit what they post on Facebook. Findings suggested that Facebook and may influence body image in some way.

MRI CONTRAST AGENTS AND THE DISTRIBUTION OF RECOMBINANT ADENO-ASSOCIATED VIRUS IN RAT STRIATUM

Jordan Wackett, Corinna Burger (Mentor), Neurology

Due to its potential clinical impact, we investigated possible effects of two intraoperative magnetic resonance imaging contrast agents, gadoteridol (Gd), and galbunin (Gb) in the integrity of recombinant adeno-associated viral vector (rAAV) particles and the distribution and levels of transgene expression in the rat striatum. Animals were injected with two AAV serotypes (AAV2 and AAV5) alone or co-infused with gadoteridol or galbunin. Densitometry and area analyses showed that Gd and Gb alter AAV2 and AAV5 differently. These results will be important in the design of gene therapy clinical trials involving gene delivery to the brain.

SYNTHESIS OF α,β -UNSATURATED CARBONYL COMPOUNDS VIA DIRECT Pd-CATALYZED AEROBIC DEHYDROGENATION

Tyler Wadzinski, Shannon Stahl (Mentor), Chemistry

α,β -Unsaturated carbonyl compounds are important intermediates in the synthesis of a wide array of organic compounds including commercial pharmaceuticals. We have developed a method to synthesize α,β -unsaturated carbonyls via direct Pd-catalyzed aerobic dehydrogenation. This reaction represents an inexpensive, environmentally friendly alternative to traditional methods. Synthesis of a diverse substrate library has shed light on the scope of this reaction, and preliminary kinetic studies suggest that α -C-H bond cleavage is the rate limiting step of the catalytic cycle. Future directions include development of chiral catalysts for aerobic desymmetrization of substituted cyclohexanones. Development of such a reaction would allow application of aerobic dehydrogenation in asymmetric syntheses of important chiral cyclohexenone derivatives.

THE FAMILY COURT ASSISTANCE PROJECT'S EVALUATION OF CLINIC RESOURCES

Andrea Walker-Cousins, Quamaine Bond, Marsha Mansfield (Mentor), Law School

The purpose of our research is to evaluate the success of unrepresented litigants who obtained help from the FCAP instead of a lawyer. The FCAP is a clinic where unrepresented family law litigants can receive legal information, forms, and guidance from law students under the supervision of experienced faculty. The first phase of the project involves surveying litigants with family court cases and recording their responses. The final phase involves reviewing responses and determining whether litigants were able to ensure success with their court case without legal representation. If this program proves to be helpful, the necessity for a lawyer will slightly decline. Also with positive results we can conclude that people are able to handle less complicated cases themselves and receive satisfactory results.

HISTOLOGICAL METHODS TO DETERMINE GRAFT-HOST SYNAPSE FORMATION

Kelly Wallin, Matthew Jensen (Mentor), Neurology

Neural stem cell transplantation is a promising therapy to improve recovery after stroke. An important objective is to determine if the grafted cells differentiate into mature neurons and are able to interact with existing host neurons through graft-host synapse formation. Various histological techniques have been reported to evaluate synapse formation, but it is unclear which method is superior. Here we review all the applicable published articles identified with a systematic search and selection strategy to find the most effective system to observe graft-host synapses in brain tissue sections. 55 articles matching our selection criteria were found, including detailed descriptions of numerous methods. The optimal technique remains unclear because no direct comparisons of methods were found. Further research is needed, specifically with comparative studies.

ANDROID-BASED FACE RECOGNITION LOGIN SYSTEM

Junjue Wang, Wei-ting Lo, Yu Hu (Mentor), Electrical and Computer Engineering Department

A biometric facial recognition login application under the android operating system is implemented. Enrolled user may gain access to a camera enabled tablet PC using face recognition. Face recognition has become popular in recent years, but not so many applications are available on mobile platforms. Applying this technology on Android can facilitate unlocking process of android mobile phone and better protect users' privacy. The first phase of the project involves building a simple android graphic user interface. OpenCV and JavaCV libraries are used for face detection and recognition. We are working on implementing Eigenfaces algorithm to convert facial images into weighted linear combinations of a set of Eigen-faces and store them in the matrix format. As such, each facial image is represented by the corresponding weight vector. By calculating the distance between the weighted vector of the query user and the stored weight

vectors of registered users, the system will determine whether the query user is one of the registered users and hence be given privilege to access the mobile device.

ECOLOGY AND CONSERVATION OF CACTI IN THE MEXICAN STATE OF JALISCO

Christopher Warneke, Lois Anderson, James Berkelman (Mentor), Forest & Wildlife Ecology
Mexico is one of the primary centers of cactus diversity with 663 species in 63 genera (58% of the world's cactus genera). Of the 128 species of cactus found in the State of Jalisco, we focused on 25 species (in 16 genera) found in our study area, the Sierra de Manantlán Biosphere Reserve, in the southwestern part of the state. We examined the habitat, growth form, pollination strategy, and ethnobotanical uses of the plants as well as their conservation priority. We make suggestions about the management of habitats in our study area to prevent the loss of cactus diversity.

THE ROLE OF NEPOTISM IN FAMILY BUSINESSES AND SOCIETY

Victoria Webb, Debra Holschuh-Houden (Mentor), Business Outreach

"A man who makes boast of his ancestors doth but advertise his own insignificance" - Benjamin Franklin. This is one of many diverse and conflicting views regarding nepotism. This literary research study will explore the role of nepotism in family businesses and society, for the purpose of identifying why there are such varied opinions concerning the viewed morality of nepotism. To do this, I research how nepotism can negatively and positively impact both family businesses and the society. This involves analysis into nepotism in different cultures including Africa, Japan and America to compare how cultural values impact the dominance of nepotism. As a subset of nepotism, I also explore the exclusion of daughters from family business succession and how this can harm the family business. I hypothesise that cultural values and extrinsic factors affect how nepotism is viewed and thus the prevalence it has within family businesses. I will conclude by discussing the phenomena of the "new nepotism" which "combines the privileges of birth with the iron rule of merit" (Conway, 2004).

INVESTIGATING DYNAMIC ICE FORMATION AND HYPORHEIC EXCHANGE AT THE EAST BRANCH PECATONICA RIVER

Matthew Weber, Steven Loheide (Mentor), Civil & Environmental Engineering

Hyporheic exchange (HE) refers to the mixing of surface water and groundwater. This research seeks to document and quantify a novel mechanism of HE. Pressure transducers placed in the East Branch Peconic River and the adjacent aquifer document a significant fluctuation in stream depth and pressure within the aquifer during ice formation, suggesting that HE may be induced. Stream and aquifer data was collected, modeled numerically, and analyzed to quantify the magnitude of HE. The research finds that ice formation (1) causes an average increase in stream depth of 106%, (2) affects stream depth 1 out of every 5 days from December through

February, and (3) did not induce hyporheic exchange at the site but has the potential in streams with less gaining conditions.

EFFECTS OF NEUROTRANSMITTERS AND NEUROMODULATORS ON ACTIVITY OF GnRH NEURONS

Morgan Weber, Ei Terasawa-Grilley (Mentor), Pediatrics

Gonadotropin releasing-hormone (GnRH) neurons in the hypothalamus are important for control of reproductive function. However, direct effects of neurotransmitters and neuromodulators on activity of primate GnRH neurons are not studied. In this study, using cultured GnRH neurons derived from the nasal placode of monkey fetuses, the effects of neuropeptides and neurotransmitters on intracellular calcium oscillations were examined. GnRH neurons were labeled with fura dye and the peak values after drug administrations were compared to baseline and the number of cells that increased, decreased, and stayed the same were counted. Results indicate that NPY, GnRH agonist, and NMDA are stimulatory whereas GnRH antagonist and kisspeptin did not cause any significant effect when compared to vehicle control.

IMPLEMENTATION OF CATALYSIS IN UNDERSTANDING ATMOSPHERIC OXIDATION

Christopher Webster, Kate Skog (Mentor), Chemistry

The hydroxyl radical, an important atmospheric oxidant, has been hard to measure, creating poorly constrained atmospheric models. Our research intends to accurately measure this concentration through the ratio of glycolaldehyde to glyoxal, using the conversion of glycolaldehyde to glyoxal by catalysis and the quantification of glyoxal by measuring the light emitted by the molecules when excited by a specific wavelength of light. The belief is that using the ratio of glycolaldehyde to glyoxal, a secondary measurement can be made of the concentration of hydroxyl in the atmosphere that can be compared to current measured values, removing some of the current error. By finding an accurate measurement, the current atmospheric models could be proven correct, or more accurate versions of them can be created.

PHOTO VOICE: IDENTIFYING THE NEED TO IMPROVE WATER SAFETY IN THE DOMINICAN REPUBLIC

Adam Weier, Denise Ney (Mentor), Nutritional Sciences

The mountain communities in the Elias Piña province of the Dominican Republic have the highest prevalence rates of diarrheal disease in the country. Using the participatory method of Photo Voice, the researcher partnered with a local NGO to collect preliminary information that will assist with the process of improving water safety in these mountain communities. The three goals of the project were to: 1) learn where the communities collected their drinking and cooking water, 2) assess their understanding of safe water, and 3) empower the communities to find practical solutions to accessing safe water. Upon evaluation, the researcher recommended that

education be provided on the attributes of safe water, the benefits of water purification and the proper chlorine-water ratio, and the characteristics of waterborne diseases.

THE ROLE OF TCF19 IN THE PANCREATIC B-CELL AND DIABETES PREVENTION

Amy Whillock, Dawn Davis (Mentor), Medicine

Insulin is necessary for transporting glucose from the blood into the cells and is produced by pancreatic β -cells. In diabetics, reduced numbers of functional β -cells lead to insufficient insulin production, resulting in high blood glucose. Tcf19 is a transcription factor and may play an important role regulating transcription during the cell cycle of the β -cell. We have previously demonstrated that knockdown of tcf19 expression in β -cells leads to reduced cell growth. We will investigate the cellular localization by cellular fractionation of tcf19 in rat INS-1 cells and human pancreatic islets. Additionally, we will research potential protein interactions and the possible role of phosphorylation through immunoprecipitation. This novel pathway to increase β -cell mass may lead to new treatments for diabetes.

EFFECTS OF STRAY DOGS ON HUMAN AND WILDLIFE POPULATIONS

Brynn Wiessner, Joseph Deraney, James Berkelman (Mentor), Forest & Wildlife Ecology

There are more than 500 million stray dogs around the world. Their presence impacts humans and wildlife that live in close proximity. The uncontrolled growth of stray dog populations in cities and surrounding areas brings with it a host of health and conservation issues, including disease, predation on endangered wildlife, competition with native predators, and many others. In our research, we examined impacts that stray dogs have on their surrounding biotic communities, choosing examples from locations around the world where they have become an unavoidable problem. Based on our evaluation of the effects of stray dogs on humans and wildlife, we propose interventions that could result in effective strategies to control their impacts on public health and wildlife conservation around the world.

IMPACT OF AGE ON LIPID ACCUMULATION IN RHESUS MONKEY SKELETAL MUSCLE

Lauren Willoughby, Rozalyn Anderson (Mentor), Medicine

Calorie restriction is a dietary intervention that has been shown to delay aging and the onset of age associated diseases. Mitochondrial energy metabolism efficiency declines with age and this impacts fat deposition within skeletal muscle fibers. We hypothesize that animals on CR diets will resemble younger monkeys in that they can utilize fat more efficiently. Muscle fibers from CR and control animals will be stained to detect lipids and high-resolution images will be captured. Using quantitative analysis of lipid deposition we will compare total lipid content and droplet distribution between CR and control-fed animals. Insight gained in this research may aid

in delaying the onset of sarcopenia and age related diseases that have a basis in metabolic dysfunction.

PREDICTING NEUTRAL-CLOUD ABSORPTION LINE PROFILES IN GALACTIC WINDS

Michelle Wojtaszek, John Everett (Mentor), Physics

We present theoretical predictions for NaI lines produced in cool clouds entrained in galactic winds (GWs) above starburst galaxies. NaI lines can be used to extract properties of cool gas entrained in the GWs. The work presented here uses the physical parameters of clouds, derived from these models, in conjunction with the stellar population modeling software Starburst99 and the photoionization code Cloudy. Together, these allow us to predict the NaI line shapes expected to occur in cool clouds entrained in GWs, and specifically for the prototypical starburst galaxy M82. In the future, comparing these line shapes with observations will help us understand and constrain the physical mechanisms that drive such large-scale winds. This work was supported by the National Science Foundation grant AST-1109218.

PHONETIC PHENOMENA IN THE SPANISH OF HERITAGE SPEAKERS

Wendy Wolf, Rajiv Rao (Mentor), Spanish and Portuguese

Heritage Spanish speakers are individuals who as a child overheard Spanish in their household in a primarily English speaking country, or immigrated before the age of six to a region where Spanish is not the principle language. Our study strives to find the difference in perception, production, and intonation of heritage speakers with respect to second language learners of Spanish by looking at variables of identity using surveys, interviews, and linguistic software. We hope our findings can change the way educators teach heritage speakers and take into account their linguistic differences. Preliminary findings include subjects with bilingual education experience and current Spanish-speaking social networks appear to exhibit the most native-like speech tendencies.

RECONSTRUCTING THE ENERGY AND COMPOSITION OF COSMIC RAYS WITH ICETOP

Adam Wright, Stefan Westerhoff (Mentor), Physics

The IceTop cosmic ray air shower array on the surface above the IceCube neutrino observatory detects the extensive air showers that result from cosmic ray primaries with energies between 0.1 PeV and 100 PeV. This energy range is of interest because of a characteristic drop in the flux of cosmic rays at 3 PeV (the knee of the cosmic ray spectrum). The reason for this feature in the cosmic ray energy spectrum is not yet known. A precision measurement of the energy spectrum in this range with IceTop could lead to a better understanding of the origin of galactic cosmic rays. We outline a method for reconstructing the energy of primary particles from the lateral distribution of charge detected by IceTop.

REVISITING ANFINSEN'S THERMODYNAMIC HYPOTHESIS: ENERGY BARRIERS ACROSS THE FOLDING ENERGY LANDSCAPE

Yufan Wu, Silvia Cavagnero (Mentor), Chemistry

The purpose of this study is to probe the role of native, unfolded and self-associated states within the protein folding landscape under physiological conditions. In contrast to Anfinsen's thermodynamic hypothesis where a monomeric protein chain folds to its thermodynamically favored native state, this work hypothesized the protein to be kinetically trapped in its native state and proposed an extended folding landscape where the more stable aggregates are separated from the native state by a high energy barrier. Aggregates of model proteins will be generated by varying temperature/pH and light scattering, mass spectrometry and circular dichroism will be used to characterize the protein species. This work may provide a more realistic kinetic/thermodynamic view of protein structure and help in overcoming aggregation in disease prevention and biotechnology.

THERMAL RESISTIVITY TESTING IN UNSATURATED SOIL

Ray Wu, James Tinjum (Mentor), Geological Engineering

Soil thermal resistivity is an important design parameter for geothermal heat exchangers and buried utilities. Current ASTM and IEEE standards provide methods for single thermal resistivity measurements, but not for generating thermal resistivity dry-out curves. This study evaluates current thermal resistivity measurement procedures for the impact of moisture migration, investigates empirical relationships between thermal resistivity and soil characteristics, and builds a soil thermal resistivity database by generating dry-out curves. Dry-out curves were generated using existing standard methods coupled with a new testing apparatus that incorporated a stage-drying procedure to measure thermal resistivity as well as incremental water contents. Test results will indicate whether the current thermal resistivity measurement techniques need modification to better account for moisture migration, providing better soil data for energy geotechnic applications.

GENERAL ABSTRACT

Xue Xia, Michael Cox (Mentor), Biochemistry

Organisms have evolved mechanisms to repair their DNA after exposure to ionizing radiation. Recent experiments revealed that a gene of unknown function, *yejH*, is required for *Escherichia coli* to survive the detrimental effects of IR, which include DNA strand breaks. Cells that contain a function copy of *yejH* have a 100 fold higher percent survival after ionizing radiation treatment than cells lacking *yejH*. Our research focus is to explore the mechanisms of YejH in cellular activities and thus to understand its putative function in DNA repair. Previous experiments predict YejH demonstrates the need for protein partners to regulate its demonstrated ATP hydrolysis activity. To test hypothesized protein partners, a series of pulldown experiments will be performed. In addition, ATPase activity assays will be performed in the presence and absence

of identified protein partners to gain more insight into the effects on YejH ATPase activity in presence of potential protein partners.

IMMIGRANT FAMILIES: LITERACY AND IDENTITY DEVELOPMENT OVER TIME AND SPACE

Ally Xiong, Catherine Lilly (Mentor), Curriculum and Instruction

The United States have had a huge flow of immigrants in the past decade. However, there have been few studies on the affects that a new culture can have on immigrant children. This study follows 15 immigrant children for three years. This research focuses on how the children's experiences interface with their experience at school. Data is collected through a series of observations and interviews of the child, parent(s), and teachers. Artifacts, such as pictures drawn by the child or a researcher's notes, are also part of the data being collected. The researcher's job is to find and/or recognize trends that occur throughout the year. Analysis methods are used to explore the child's experience compared to time and location and to identify identity construction. This study is part of a growing body of research on immigrant children and their development over time and space. This project could influence the ways education can be taught.

STOPPING INFECTION WITH HAND HYGIENE

Samty Xiong, Nasia Safdar (Mentor), Medicine

The purpose of this research is to implement a more effective protocol for hand hygiene practice at the University of Wisconsin Hospital. There are nearly two million hospital infections every year in the U.S. Hand hygiene practice can prevent the spread of infections greatly. Lack of hand hygiene performance leads to nosocomial infections and higher healthcare costs. Although the project is still early in its stages, designated hand hygiene observers record hand hygiene performance by hospital workers at different opportunities where hand hygiene is crucial using a standard observation collection form. The ultimate goal of the project is to improve hand hygiene practice in the hospital and to bring more awareness about hand hygiene by a proposal for implementing hand hygiene more effectively.

BUILDING A QUANTITATIVE MODEL OF THE CHOLESTEROL BIOSYNTHESIS PATHWAY

Payeng Yang, Laurence Loewe (Mentor), Genetics

This project aims to find currently known speeds and other kinetic parameters of individual reactions within the Cholesterol Biosynthesis Pathway. To locate existing measurements, we use public databases such as <http://brenda-enzymes.org> and <http://pubmed.org>. These databases contain references to the scientific literature in which the actual measurements were first reported. We check original sources for misquotes and collect the variability associated with measurements, which is not reported in the databases. This information is integrated into a model of the pathway that makes it simple to refer back to the original sources. This model is formulated

in a syntax that we are designing to be machine readable, and allows humans to easily check the integrity of measurements included.

IDENTIFICATION AND CHARACTERIZATION OF RPO-S-REGULATED OUTERMEMBRANE PROTEINS IN E. COLI O157:H7

KaHoua Yang, Amy Wong (Mentor), Bacteriology

E. coli O157:H7 is a food pathogen with exceptional tolerance to certain stressful growth conditions. In such conditions, RpoS and RpoS-regulated genes are strongly induced. RpoS-mediated response in outer membrane proteins (Omps) of O157:H7 has not been investigated extensively. In this study, we identified and characterized Omps regulated by rpoS under different stress conditions. The Omp profiles of strain EDL933 and isogenetic derivative rpoS mutant were compared. Omps downregulated in the rpoS mutant during stationary phase were identified as OmpX, Slp, and Dps by SDS-PAGE and MALDI-TOF mass spectrometry. RT-PCR analysis showed that stationary phase transcription of *dps*, *slp* and *ompX* was reduced in the rpoS mutant compared to the wild-type. Promoter sequence analysis suggested that *slp* is directly regulated by RpoS while *ompX* is indirectly regulated.

PROBING NEUROENDOCRINE REGULATION OF ENERGY HOMEOSTASIS BY MASS SPECTROMETRY

Sujin Yoo, Lingjun Li (Mentor), Pharmacy

Due to its well-defined neural network and a rich repertoire of neuropeptides, crustaceans have been used as a model system for understanding human neuroendocrinology. Neuropeptides play a crucial role in energy balance in the animal kingdom. The goal of this project is to characterize the Crustacean Hyperglycemic Hormone (CHH) family neuropeptides employing various types of mass spectrometry (MS). The resultant MS spectra and fragmentation pattern will be used to identify the peptide sequences. Although numerous peptides have been identified in the blue crab, *C. sapidus*, we expect to identify novel ones from this species, using a combination of bottom-up and top-down approaches. The identified neuropeptides will provide a foundation for future studies on the physiological roles of signaling molecules in such neural network.

PERCEPTIONS OF ISOLATION PRECAUTIONS

Riley Young, Nasia Safdar (Mentor), Medicine

The purpose of this research is to describe patient and healthcare worker (HCW) perceptions of isolation precautions used to decrease infection transmission in hospitals. Specifically, the complex relationship between patients and HCW will be studied to identify potential barriers to compliance with isolation precautions. The effectiveness of hospital isolation to reduce disease transmission is dependent on protocol adherence by both the patient and HCW. Qualitative semi-structured interviews are used to collect data from the patients. Findings from patient interviews will then be used to conduct focus groups and surveys with HCW. After discovering potential

barriers to implementation and continuation of isolation precautions from both patients and HCW, areas for improvement may be identified.

STRUCTURE OF THE ISOLATED PIN1 WW DOMAIN OBTAINED BY RACEMIC CRYSTALLIZATION

Hyun Gi Yun, Samuel Gellman (Mentor), Chemistry

Small isolated protein domains with tertiary structure have been studied as models for developing fundamental understanding of protein folding. The isolated Pin1 WW domain, which is a 36-residue three-stranded antiparallel beta-sheet tertiary structure, has served as a useful prototype in studies of protein folding and the effects of unnatural amino acid incorporation; however, there is no X-ray structure available for the isolated Pin1 WW domain. In this work, the X-ray structure of the isolated Pin1 WW domain was determined through racemic crystallization, whereby a racemic mixture of L- and D-polypeptides were combined to afford diffracting crystals. The space group of racemic Pin1 WW domain was determined to be I41/a, and structural refinement was carried out in Refmac5 at 2.25 Å resolution.

BADRI CARPENTRY

Arnel Zahirovic, Debra Holschuh-Houden (Mentor), Business Outreach

Amin Badri is a Solo business owner in the area of carpentry located in Melbourne, Australia. Although he has 3 brothers and 3 sisters, he is the only one in the family to run and own the business. My project will be to evaluate how his business is run without the help of any intermediate family. Essentially I will be comparing communication and leadership between entrepreneurs who hire within family and those who hire outside of their family. After researching similar scenarios, I have focused more on the communication, and leadership aspect. I plan to compare Ramin's story with a business run by 2 or more family members, and see how they parallel in leadership, and communication.

NONSENSE-MEDIATED MRNA DECAY TARGETING IN THE S. CEREVISIAE MSH4 GENE

Bethany Zeitler, Michael Culbertson (Mentor), Genetics

Nonsense-mediated mRNA decay (NMD) is a mechanism of post-transcriptional gene regulation shown to target select mRNAs for degradation by two mechanisms, and in both cases out-of-frame stop codons are recognized as premature, triggering NMD. A third targeting mechanism is triggered by the 3'-untranslated regions (3'-UTRs) of some mRNAs, but the molecular basis is currently unknown. We have shown that the 3'-UTR of the MSH4 gene in *Saccharomyces cerevisiae* targets a transcript produced by a CUP1-GFP-MSH4-3'UTR fusion for degradation by NMD. Among two transcripts of unequal length that are produced from the fusion gene, the longer transcript is degraded by NMD. We hypothesize that NMD targets the longer transcript for degradation by recognizing the normal translational stop codon as a premature stop codon.

THE MEDIEVAL HERO TALE IN JAPANESE VISUAL CULTURE

Stephen Zellmer, Quitman Phillips (Mentor), Art History

Professor Phillips is currently working on a book dealing with texts and images related to Shuten Dôji, Japan's most popular pre-modern story of warriors battling monsters. As his intern my task was to aid in the examination of the genre to which the Shuten Dôji tales belong: illustrated medieval hero tales. I was responsible for analyzing his translation of the most influential version of the Shuten Dôji story in order to produce a preliminary set of key elements. Stories of the genre that shared important features in their plots, characters, and cultural motifs were then analyzed and the important features were organized into a searchable database to make working with the information and exposing the important connections between stories easier.

SORTING NEXIN 5 AND PIP2 BINDING IN REGULATION OF EGFR DEGRADATION

Sheldon Zhai, Andrew Hedman (Mentor), Cellular and Molecular Pharmacology

Epidermal growth factor receptor (EGFR) is a critical regulator of development, cell migration, and proliferation. Improper regulation of EGFR signaling has pathogenic effects and is implicated in a wide variety of cancers. Therefore, EGFR signaling must be carefully regulated by endocytosis and degradation of the receptor to prevent over activation. We have identified a novel regulator of EGFR signaling, a splice variant of the type I phosphatidylinositol phosphate kinase gamma (PIP1 γ), PIP1 γ 5. PIP1 γ 5 is found at intracellular compartments, and generates the lipid messenger, phosphatidylinositol 4,5 bisphosphate (PIP2). A trafficking regulator, Sorting Nexin 5 (SNX5) was found to interact with PIP1 γ 5. Furthermore, SNX5 contains a phox homology (PX) domain which binds to PIP2. Knockdown of either PIP1 γ 5 or SNX5 blocks EGFR degradation, resulting in enhanced and prolonged EGFR signaling. In this study, the long term goals are to determine the residues in the SNX5-PX domain necessary for binding PIP2, and the role they play in EGFR degradation pathway. These data will improve our understanding of how EGFR turnover is regulated by phosphoinositides, PIP1 γ 5 and SNX5.

CSK SIGNALING CONTROLS PROLIFERATION OF HUMAN CARDIOMYOCYTES DERIVED FROM PLURIPOTENT STEM CELLS

Kexian Zhu, Xiaojun Lian, Sean Palecek (Mentor), Chemical Engineering

Heart disease is the leading cause of death in United States with over five million people suffering heart failure every year. Unlike other organs such as the liver, adult hearts have very limited, if any, ability to regenerate. Previous studies showed that heart muscle cells, also known as cardiomyocytes, proliferate during pre-natal heart development but withdraw from cell cycle after birth. Our study demonstrated that negative regulation of CSK signaling by RNAi greatly improved the proliferation ability of human cardiomyocytes derived from pluripotent stem cells using a directed cardiac differentiation protocol developed in our lab. This discovery opens up potential venues to repair damaged human hearts by inducing the regeneration of the heart tissue.

GADGET - GENES ASSOCIATED BY DOCUMENTS, GENES, EVENTS, AND TEXT

Matthew Ziegler, Mark Craven (Mentor), Biostatistics and Medical Informatics

A common time-consuming task for biologists is searching the literature to find genes and gene interactions associated with a particular topic. We present a new tool called GADGET (Genes Associated by Documents, Genes, Events, and Text), available as a web application, to facilitate this task. Given a keyword query or list of genes as input, GADGET uses information retrieval techniques to return a list of genes relevant to the user's query. The genes can be scored and sorted by a variety of criteria. GADGET also includes the ability to search for gene interactions, automatically extracted from the biomedical literature by probabilistic machine learning algorithms. By making this technology accessible to biologists, we hope to reduce the time spent searching the literature for genes. <http://gadget.biostat.wisc.edu>

THIAMINE BIOSYNTHESIS IN A HETEROLOGOUS SYSTEM

Justin Zik, Diana Downs (Mentor), Bacteriology

Salmonella enterica generates thiamine de novo through the independent synthesis and subsequent condensation of 4-amino-5-hydroxymethyl-2-pyrimidine (HMP) and a thiazole moiety. In a strain of *S. enterica* that is unable to make HMP (i.e., thiC), the THI5 protein from *Saccharomyces cerevisiae* can restore HMP synthesis if casamino acids are present. How THI5 generates HMP is not yet known. My work will provide insights into the substrates THI5 uses in the synthesis of HMP by taking advantage of our knowledge of *S. enterica*. Thus far transposon mutagenesis has been used to disrupt growth of a THI5-dependent strain of *S. enterica* on casamino acids. Characterization of these mutations will be the initial step in determining a shift(s) in metabolic flux that can make the substrates of THI5 available.

IS THE RETINOIC ACID RESPONSIVE GENE, NEDD9, REQUIRED FOR ADULT NEUROGENESIS?

Krista Zillmer, Margaret Dame (Mentor), Biochemistry

The retinoic acid (RA) responsive gene NEDD9 is expressed in the adult nervous system. Preliminary tests using a B-gal reporter in place of NEDD9 indicate a strong presence of NEDD9 in the hippocampus. NEDD9 knockout mice showed reduced ability to remember the location of a hidden platform in a pool, which suggests deficits of spatial learning and memory, both functions of the hippocampus. Hippocampal learning and memory have been shown to be affected by changes in RA levels and mice with lower levels of RA display deficits in spatial learning and memory tasks. These mice also show reduced levels of neurogenesis. The goals of this study were to compare hippocampal morphology and organization between wild type and knockout mice and to determine if there is evidence of decreased neurogenesis in adult NEDD9 mice.

ASSESSING IMPORTANCE OF ZAP1 REGULATED GENES FOR ZINC-LIMITED GROWTH IN SACCHAROMYCES CEREVISIAE

Ginelle Zimmerman, David Eide (Mentor), Nutritional Sciences

The Zap1 transcription factor in yeast *Saccharomyces cerevisiae* plays an important role in homeostasis under zinc-limited conditions. Previous experiments showed 80 potential Zap1 target genes, but in a following functional genomics analysis only 8 of these genes were found to affect low zinc growth. We hypothesize that the remaining 72 potential Zap1 target genes were not detected because the genomics assay was not sensitive enough. By growing each individual mutant strain in competition with a GFP-tagged wildtype strain and counting the cells by flow cytometry, we will detect even minor growth defects among the 72 remaining Zap1 target genes. These studies will identify genes important for growth of the yeast *Saccharomyces cerevisiae* in zinc-limited conditions.

PREFERENCE OF HAWKMOTH AND BUMBLE-BEE FOR FLORAL TRAITS IN THE ROCKY MOUNTAIN COLUMBINE, AQUILEGIA

Ross Ziobro, Johanne Brunet (Mentor), Entomology

Pollinator preference can affect floral morphology and therefore the diversification of flowering plants. As a first step in determining whether the two major pollinators of the Rocky Mountain columbine, hawkmoths and bumble bees, could differentially select for floral traits, we examined their preference for these floral traits. We used the white-line sphinx moth (*Hyles lineata*) and the common eastern bumble bee (*Bombus impatiens*) in experiments. We presented different scents, or pairs of flowers of different color, size, or spur length to the pollinators and recorded which flower was visited first to determine whether a pollinator preferred a given floral trait. These data will further our understanding of the potential selection pressures exerted on floral traits by the major pollinators of this species.

CONNECTEXT

Chelsie Zitzlsperger, Breanne Litts (Mentor), Curriculum and Instruction

Good readers always make connections as they read. Items are more quickly learned when they are meaningful or can be associated with other ideas. In order to facilitate making connections with texts that are seemingly unfamiliar or difficult to relate to, *conneCText* asks players to practice the skill of identifying with aspects of a text by going beyond surface-level characteristics and instead focusing on the deeper meaning of the text. These "deeper meaning" ideas allow a reader to better relate to texts that may seem disconnected from their own life. The game format makes learning more interactive, competitive and fun! Though *conneCText* has not yet been played in a classroom the game should provide a break from typical classroom activities while still encouraging learning.

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