

THE OFFICE OF UNDERGRADUATE RESEARCH AND CREATIVE INQUIRY PRESENTS THE 15TH ANNUAL RESEARCH POSTER SYMPOSIUM

> K-State Student Union Ballroom Sunday, April 19, 2015 1:30-3:30 p.m.



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### Aspects of Cross-Cultural Relationships of Buyer/Suppliers and Sales Managers/Sales Persons

Abigail Agnew, Dr. Dawn Deeter-Schmelz, Dr. John Rudd Department of Marketing College of Business Administration

This qualitative research study looks to examine the relationship dynamics between sales people and customers, and sales managers and sales people, who are operating cross-culturally; for instance, an American producer selling parts to a Brazilian manufacturing company, or a sales manager in London overseeing employees in China. To do this, employees of several different businesses involved in various global industries were interviewed and asked to list what they felt were the most difficult aspects of working with individuals coming from a different culture. The interviews were transcribed and then coded using a set of terms which addressed the various issues cited by the interviewees. These codes were then compared to a set of cultural dimensions dealing with organizational leadership. These dimensions were developed by the GLOBE Project, and include performance orientation, uncertainty avoidance, humane orientation, institutional collectivism, in-group collectivism, assertiveness, gender egalitarianism, future orientation, and power distance.

Similar research exists; the relationships developed by people in various business partnerships are generally what make or break a company. This project extends previous research by looking into how cultural differences affect the way that firms do business internally and with one another, as well as looking at what adaptations might be made when supervising individuals who were raised in other cultures. It appears that people have the most trouble with in these sorts of situations are communication difficulties, the simple fact of deep-seated cultural differences, and problems developing trust between the involved parties. Interviewees have noted that adaptation to a country's culture, and finding ways to develop more friendly relations (with both customers and employees) are good ways to overcome some of these difficulties.

Preparation of Peptide Nanotubes using Double Stranded Oligo-Nucleotides as a Template Edson Alfaro, Kayla Wilkinson, Susan K. Whitaker, L. Adriana Avila, John M. Tomich Department of Biochemistry and Molecular Biophysics College of Arts and Sciences

Peptide nanotubes have been used for decades in the fields of molecular separation and transport, catalysis, optics, electronics, chemotherapy, drug delivery, and other fields. Our goal for this project is to prepare peptide nanotubes using double stranded oligo-nucleotides as a template. Our task is to study the kinetics of uptake of differently sized nanotubes to see if there is a size preference for the efficient uptake of the fluorescent dye Carboxyfluorescein (CF)-- a dye that will be used to study the loading of the nanotubes. This research will be conducted on pairs of DNA oligo-nucleotides 30-bases in length. The DNA pair will first be annealed by heating followed by slow cooling. After annealing, the DNA pair will be incubated with an excess of free bis(Ac-FLIVIGSII)-K-K4 and bis(Ac-FLIVI)-K-K4 peptides which self-assemble and will coat the double stranded DNA with a peptide bilayer. We will then digest away the DNA template with a mixture of glutathione (GSH) and copper sulphate (CuSO4). After the DNA template has been digested away, we will be able to see through Transmission Electron Microscopy (TEM) and Atomic Force Microscopy (AFM) images how the DNA free capsules hold up. The results obtained from these experiments will indicate a potential new drug delivery method.

#### **Finding What Impacts Learning in Introductory Physics**

Ben Archibeque, Dr. Eleanor Sayre, Mechanics Working Group Department of Physics College of Arts and Sciences

Measuring the effectiveness of various classroom aspects across universities is an ongoing problem for physics educators and education researchers. A common method is to administer research-based conceptual inventories, the Force and Motion Conceptual Evaluation (FMCE) and the Force Concept Inventory (FCI), to students, and compare these results to their peers in other classes. We conducted a secondary analysis of all peer-reviewed papers which publish data from US and US-like colleges and universities, including over 50,000 students in approximately 100 papers. We ran statistical analyses between classroom data, like SAT scores, math level, and pedagogy, and institution data from the Carnegie Classifications, to see what impacts student learning. We found that while teaching method is important, it is not the only factor that influences student learning.

#### Brewing Coffee Party Activism in Tea Party Territory: Faith and Politics in Rural America

Tayler Christian, Alisa Garni, Ph.D., L. Frank Weyher, Ph.D Department of Sociology College of Arts and Sciences

What is the relationship between "Coffee Party" activism and religious faith? "Prairie City," a conservative Republican and Tea Party stronghold, has recently become home to one of the most active local chapters of the national Coffee Party movement. Although the Coffee Party is officially non-partisan, locally it is Left-leaning. While scholars often focus on the association between religion and the political Right, local Coffee Party members participate actively in a variety of religious congregations, and questions of faith and political activism frequently arise at events and gatherings. In our ethnographic research of this organization, we explore how and why a Coffee Party formed in an area of Republican, Tea Party dominance; how religion informs members' activism and political stances; and how participants in the movement navigate religious tensions that emerge from their activism. Further, given that strong but diverse religious commitments inform many local members' views and activities, how does religious diversity affect both the social movement and members' connection to other local social institutions? Such research should deepen our understanding of the relation between religion and politics across the political spectrum as well as of inter-faith social movements on the political Left more particularly.

#### **Studying the Protease Expression of Triple Negative Breast Cancer**

Raquel Ortega<sup>1</sup>, Aruni P. Malalasekera<sup>1</sup>, Asanka S. Yapa<sup>1</sup>, Dr. Dinusha Udukala<sup>1</sup>, Dr. Thilani Samarakoon<sup>1</sup>, Dr. Hongwang Wang<sup>1</sup>, Dr. Deryl L. Troyer<sup>2</sup>, Dr. Stefan H. Bossmann<sup>1</sup>

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Triple-negative breast cancer (TNBC) is comprised of any breast cancer that is not characterized by expression of the estrogen receptor (ER), progesterone receptor (PR) or Human Epidermal Growth Factor Receptor 2 (Her2/ neu). Just in the United States, this heterogeneous group of cancers accounts for up to 25% of all breast cancer cases. When speaking of basal-type breast cancers, 50% to 75% are triple-negative. Since no standard protocol exists to identify them yet, it is important to develop analytical methods to distinguish subgroups of TNBCs. Proteases, such as matrix metalloproteinases (MMP's), urokinase plasminogen activator (uPA), and cathepsins are enzymes necessary for the development and progression of cancer and are therefore overly-expressed in cancer cells. By measuring the expression pattern of MMP's, uPA, and cathepsins in cancer cells, one can use these proteases as a biomarker for an earlier detection of breast cancer. One way to measure MMP and uPA activity is by the use of nanoparticles. By using an Fe/Fe3O4 nanoparticle as a nanoplatform specific to each MMP, uPA, and cathepsin, the fluorescence resulting from the cleaved consensus sequences of cyanine dyes and porphyrins results in detection as sensitive as down to 1\*10 -16 mol 1 -1. This fluorescence assay may lead to a cheap, simple, and sensitive way to obtain an early diagnosis of solid tumors. The results obtained for TNBC are discussed here.

#### The Unicycle (Single Wheel Self-Balancing Robot)

Sergio Ortiz<sup>1</sup>, Alan Ramirez<sup>2</sup>, Warren White<sup>2</sup>, Skyler Butler<sup>2</sup>, Alex Vaske<sup>2</sup>, Jonathon Monroy<sup>2</sup>, Kristine Larson<sup>2</sup>, Lucas Gorentz<sup>2</sup>, Cameron Lucero<sup>2</sup> <sup>1</sup>Department of Electrical and Computer Engineering <sup>2</sup>Department of Mechanical and Nuclear Engineering College of Engineering

The Unicycle is a single-wheeled, self-balancing robot. This battery-powered device uses sensors to detect the twist and lean orientation as well as its position on the floor as it balances itself. Using an inertial wheel, the Unicycle is made to lean to one side in order to make turns. The Unicycle is designed to be compatible with both National Instruments myRIO and STM32F401C-Discovery Board microcontrollers interchangeably. The purpose of this project is to continue building on to the previous project called the Segbot, which is a two wheeled self-balancing robot. The present project is to create a robot that only uses one wheel to balance. By using the various microcontrollers, this robot can be used for engineering student applications and for laboratory applications in some mechanical engineering classes. The process to create this robot consists of using CAD drawings to have a virtual representation of the robot in order to create a precise model before beginning building. The model is used to design the controller so the controller can be tested before the unicycle is built. Using the CAD drawings, the base and some of the parts are sent to be 3-D printed and others ordered. The project, currently in development, is to design the unicycle and controller, build the unicycle, and test the result. We are integrating two different microcontrollers to provide flexibility for both application and teaching opportunities. We are currently in the development stages for the CAD Drawings and controller design.

# Effect of Protein and Lactose Concentrations on Bleaching of Whey Using Ozone

Daniel Buyanovsky<sup>1</sup>, Jayendra Amamcharla<sup>2</sup> <sup>1</sup>Department of Food Science and Industry <sup>2</sup>Department of Animal Sciences and Industry College of Agriculture

Annatto is a colorant used in cheddar cheese manufacturing to produce a consistent product throughout the year. However, a portion of the colorant is retained in whey, which is undesirable. Currently, the only FDA approved methods of bleaching whey are hydrogen peroxide and benzyl peroxide with some restrictions. A newer method gaining traction is the use of ozone. Ozone is a strong oxidizing agent with an oxidizing potential of 2.07 eV. The solubility of ozone in water is highly influenced by organic impurities and temperature. This in turn influences the effectiveness of ozone. The objective of the study was to evaluate the effect of protein, lactose, and temperature on the %Reduction of annatto in model solutions. Different concentrations of lactose (0 - 5%) and whey protein (0 - 0.8%) in model solutions were prepared using whey protein isolate and lactose. The model solutions were processed in a bench-top ozone treatment system provided by CleanCore Technologies LLC at 10, 25, and 43°C. Approximately 98% of the annatto was bleached in the absence of protein and lactose. The %Reduction was further reduced to 5.9% in the presence of 0.8 and 5% protein and lactose, respectively. It was found that the protein concentration and treatment temperature was significantly (P<0.05) affecting the %Reduction. On the other hand, lactose was not significant (P>0.05). Ozone shows potential to be an effective bleaching agent. Further studies are needed to evaluate %Reduction at higher concentrations of ozone.

# Visualization in Big Data Analytics

Olivia Baalman, Dr. William Hsu Department of Computer Science College of Engineering

Human minds cannot always adapt to keep pace with the rate of accumulation of data and the speed of changes in technology. One way to alleviate this problem is to present data in an interactive visual format to allow humans to better access and understand it. Data accumulation rates have increased exponentially since the development of digital computers and the internet. Developments in big data, the processing of unstructured data of high volume (terascale and petascale), velocity, and variety, have presented new computational challenges. This includes not only representing and analyzing terabytes of data, but delivering visualizations of both the original data and analytical results. Information visualization has become more accessible as a tool to users in applied computing because of increasing computer power, faster graphics processors, higher connectivity, and of course the amount of raw data and processed information. In order to maximize the success of visualizations, the graphic display must show the data, maximize the ratio of essential data to ink or pixels, and reduce unneeded image rendering. These visualizations should be comparative rather than descriptive.

As a member of the Kansas State University Laboratory for Knowledge Discovery in Databases (KDD Lab) under the direction of Dr. William Hsu, I have taken part in a team organized by Dr. Ellie Sayre of the Kansas State Physics Department with the KDD Lab. One goal of this work is to construct a computer program to monitor a class's test scores and recommend a course of action for the course instructor to improve student test results. By organizing this information in better-federated visual displays, it will allow faculty to better understand the data.

#### Spatial Distance and Construal Levels of Consumers' Decision Process Ramone Armstrong, Janis Crow Department of Marketing

College of Business Administration

The purpose of this project is to test persons' decision processes when choosing between businesses that are located close together versus ones separated by distance. The goal of this project is to identify the type of decision processes consumers take when choosing from various retail stores. The outcomes could provide evidence to improve the likelihood of retail store traffic. We are examining consumers' decision processes by using the Construal-Level Theory (CLT), when they choose among businesses with similar product offerings depending on the travel distance. CLT proposes that increasing the reported spatial distance of events leads individuals to represent distant events by their central, abstract, global features (high-level construal) rather than close events by their peripheral, concrete, local features (low-level construal). Prior research has examined consumers' decision outcomes, not decision processes. Building on previous research, we hypothesize that consumers' who choose a business located closer will engage in a simplistic, heuristic-type, decision process, whereas, consumers choosing a spatially distant location will engage in a more effortful strategy. The study uses an experimental design to survey participants to describe their decision processes when choosing among businesses varied by location and density.

# **3D** Printing Animal Bone Fractures through Experimental Applications in Digital Fabrication

Kelsey Castinado, Dustin Headley Department of Interior Architecture and Product Design College of Architecture Planning and Design

This research seeks connections and collaborations across disciplines, departments, and other strata that separate designers from other professionals to re-envision the relationship we, as designers, play in professional activates. Through this position, the design profession is poised to not only augment the body through these tools, but to augment the progressions themselves. Given our skills as designers to understand complex issues with diverse variables, engaging in the development of processes that leverage our process thinking (as distinct from our actual workflow with our various drafting tools) enables us to posit new questions about our role in professional environments. This is an early phase and we are currently exploring the thresholds of 3D scanning equipment, 3D printers, CNC machines that we have at our disposal. In these explorations we are connecting with veterinary professionals in K-State's Veterinary Medicine College in the development of 3D printed bone fractures, exploiting the ability of the designer to translate information into physical constructions. Using Rhinoceros 3D, InVesalius, and FormOne 3D printers, we've developed a work flow that enables the full scale printing of bone fracture and deformities. These pieces enable the doctor dealing with these issues to visualize and strategize about their operations procedure in new ways, as well as shifts the process that these operations are explained to the patients. Next we are waiting on a grant to be able to purchase more materials to 3D print, as well as obtain a 3D printer with a high quality of print. In the mean time we will be converting the 3D body scans into digital 3D models and printing them on a low resolution printer.

#### Connecting Incarcerated Mothers and their Children: An Exploration of Contact Maintenance Programs

*Kiera Brown, Lisa A. Melander* Department of Sociology, Anthropology, and Social Work College of Arts and Sciences

The upsurge in incarceration rates in the United States has become a serious problem, especially when considering the impact imprisonment has on familial relationships. In particular, the increase in female incarceration rates has resulted in more children growing up without the presence of their mother. This disruption in the mother-child relationship has been associated with social and emotional consequences for both mother and child. As a means to combat these deleterious outcomes, many prison facilities across the country have implemented contact maintenance programs. These programs facilitate various means of positive contact between incarcerated mothers and their children including extended visitation, telephone calls as well as sending birthday cards and gifts. Little research exists regarding the efficacy of these programs. As such, the purpose of this research is to explore various facets of one contact maintenance program, the Women's Activities and Learning Center (W.A.L.C.) at the Topeka Correctional Facility in Topeka, Kansas. Specifically, in-depth interviews will be completed with both W.A.L.C. staff and participants to help us understand more about a variety of issues including mother-child attachment, the development of mothering identities among participants, the relationship between participation in the program and misconduct reports, and the co-parenting relationship between the inmate and the child(ren)'s caregiver. The outcomes of this research will determine the overall effectiveness of such programs and can influence the ways in which contact maintenance programs are managed in the future.

Fruit and Vegetable Consumption associated with Cardiovascular Disease

Alyssa Baquero, Kelsey Jepson, Brooke Cull, Emily Mailey, Sara Rosenkranz Department of Human Nutrition College of Human Ecology

BACKGROUND: High intake of fruits and vegetables (FV) may be protective against cardiovascular disease (CVD), however data shows that adults typically do not meet FV intake recommendations. Previous literature suggests that with positive lifestyle changes related to physical activity, positive changes related to diet are often made concurrently. It is unknown whether participating in an intervention to reduce sedentary behavior would be accompanied by increases in FV consumption and subsequent improvements in CVD risk factors. PURPOSE: The objective of this study was to determine whether FV consumption is associated with CVD risk factors in women who are insufficiently active, and whether participation in a sedentary intervention is associated with changes in FV consumption. METHODS: Women working full-time sedentary jobs (n=29) were recruited to an 8-week intervention to decrease time spent in sedentary behavior. Participants were asked to complete 3-day food records (2 weekdays, 1 weekend day) at baseline and 8 weeks. At those time-points, fasting CVD risk factors were assessed. FV consumption was determined using Nutritionist Pro software. RESULTS: At baseline, combined FV consumption was 1.2±0.8 cups/day, and did not significantly change over the course of the intervention. Baseline FV consumption was not associated with CVD risk factors (p>0.05). Differences in FV consumption from baseline to week 8 ( $+0.02\pm2.2$ cups/day) were associated with changes in total cholesterol ( $-10.5\pm20.3$ mg/ dL) (p=0.032). CONCLUSION: Results from the current study suggest that there is an association between changes in FV consumption and total cholesterol during an eight-week intervention to reduce sedentary time in insufficiently active women.

# Riding the Fungal Highway: Motility of Bacteria on Rhizoctonia solani Fungal Hyphae

*Eduardo Acosta, Zhao Peng, Frank White* Department of Plant Pathology College of Agriculture

The capacity of fungi to serve as vectors for the dispersion of bacteria was analyzed in a bacterial/fungal culture in the laboratory. We hypothesized that bacteria might use fungal hyphae for dispersal in the environment, including into plant tissue. To test the hypothesis, we tested the ability of an *Enterobacter* species that is found in close association with the plant pathogenic fungus *Rhizoctonia solani* to move along the hyphae of the pathogen. The movement of the bacteria was compared to other bacterial strains. Mutations of *Enterobacter* strain were engineered in genes that are predicted to alter motility, and the mutants were tested for their ability to move along fungal hyphae. We hypothesize that the disruption of flagellar genes will hinder the mobilization of *Enterobacter* through fungal hyphae by incapacitating the flagellar assembly and, as a consequence, normal flagellar motility. Flagellar genes *FlgH* and *FlgE* were selected for mutation. Truncated genetic copies of the selected genes were generated by polymerase chain reaction (PCR) and cloned into a pKNOCK-Km suicide vector which was propagated in E. coli and introduced into *Enterobacter* by means of electroporation. *Enterobacter* will be assayed for motility on agar plates as well as along fungal hyphae in an *Enterobacter/Rhizoctonia solani* culture.

# **Expression of ACEL in Molting Fluid of Manduca sexta**

Thuy Cao, Dr. Neal Dittmer, Dr. Michael Kanost Department of Biochemistry and Molecular Biophysics College of Arts and Sciences

Insects have an external exoskeleton they must shed in order to grow. While molting, insect epidermal cells produce enzymes to degrade the old cuticle. Two enzymes identified in molting fluid are proteases similar to angiotensin-converting enzyme (ACE) found in mammals. The protein is a peptidyl-dipeptidase belonging to the M2 GluZincin superfamily. Near the carboxyl-terminus is a zinc-binding active site therefore classifying the enzyme as a metalloprotease. ACE is essential to regulate blood pressure in mammals through the cleaveage of angiotensin I, thereby converting it to angiotensin II. However insects possess an open circulatory system and yet contain several ACE-like enzymes which suggest other potential functions for the ACE-like proteases (ACEL). The tobacco hornworm, Manduca sexta, is used as the model organism to investigate the role of the enzymes in insects. Two different expression systems will be used to produce the enzyme ACEL1, the protein of interest. After synthesis, the enzyme is subjected to a series of purification steps to obtain a pure sample. From the pure sample, enzyme activity will be analyzed in order to compare to the mammalian ACE. ACEL2, the second enzyme, will be studied to differentiate between the two related insect ACEL.

#### The association between Addison's disease and a thin intestinal tract lining

*T. Brandt*<sup>1</sup>, *T. Schermerhorn*<sup>2</sup> <sup>1</sup>Department of Animal Sciences and Industry College of Agriculture <sup>2</sup>Small Animal Internal Medicine Veterinary Health Center

We are researching the connection between Addison's disease (hypoadrenocorticism) and decreases in the thickness of the lining of the gastrointestinal (GI) tract of dogs. Addison's disease is an endocrine failure of the adrenal gland's cortex. Addison's disease is difficult to diagnose clinically because the symptoms overlap with non-endocrine diseases and the available tests are expensive or not available to all practices. Diagnosis is especially difficult during an Addisonian crisis, when affected dogs are at risk for death if the disease is not recognized. Many dogs are not diagnosed with Addison's disease until late in the disease process. As dogs undergo an abdominal ultrasound as part of the diagnostic workup before diagnosis, a strong association between a thin GI tract and Addison's disease could make veterinarians aware of the possibility of a crisis. To investigate a possible association, we are doing a multicenter retrospective case study. Dogs definitively diagnosed with Addison's disease using an ACTH test that had an abdominal ultrasound on or near the time of original diagnosis are being studied to measure the GI tract. A veterinary radiologist will assess the ultrasound studies of each patient so the measurements are consistent. Preliminary data indicates that there will be a significant difference between the overall thickness of the individual bowel layering of dogs with Addison's disease and previously established norms. Every dog in the study has a history of GI signs accompanying Addison's disease, leading us to hypothesize an association between the two findings. The final analysis is ongoing. A finding of decreased GI tract thickness during routine ultrasound examination should prompt consideration of Addison's disease as a differential diagnosis in dogs with other clinical signs consistent with Addison's disease.

Dr. Martin Luther King, Jr. and Malcolm X: Truths and Misconceptions

Daniel Dissmore<sup>1</sup>, Dr. Myra Gordon<sup>2</sup> <sup>1</sup>Department of History College of Arts and Sciences <sup>2</sup>Office of Diversity

Dr. Martin Luther King, Jr. and Malcolm X are two of the most influential leaders in the African-American community and in the struggle for human rights around the world. However, many people misunderstand and/or are misinformed about their teachings. Among the misconceptions is that King and X had very opposing views. The research project was conducted to reveal an accurate understanding of Martin Luther King's and Malcolm X's teachings, and to gauge the level of understanding that people might have. The project was divided into two parts. The first part involved examining and analyzing the writings and speeches of King and X. This work found that though much of King's teachings were based upon Christian principles and much of Malcolm X's teachings were based on principles of Black Nationalism, the two men advocated for many similar things. In fact, there were more similarities among their teachings than differences. The second part of the project involved surveying the Kansas State University student body to find out what levels of understanding people have about these two iconic leaders. The survey also analyzed whether or not different demographic groups, based on age, gender, race, field, place of upbringing, religion, socioeconomic status, and political ideology have better understandings than others. Open-ended questions in the survey dealt with knowledge of the two men's teachings, extent of agreement with the various teachings, and primary sources of knowledge. The survey results revealed that people across all demographic groups have a limited and often misinformed understanding of both men's teachings.

#### Environmental and Energy Evaluation of Manhattan Area Habitat for Humanity Affordable Housing Prototypes

Megan Cantu<sup>1</sup>, Michael Gibson<sup>1</sup>, Roxann Janes<sup>2</sup> <sup>1</sup>Department of Achitecture College of Architecture Planning and Design <sup>2</sup>Director of Manhattan Area Habitat for Humanity

Habitat for Humanity's vision is "a world where everyone has a decent place to live." The organization's main objective is to organize volunteer and donated resources around in the construction of affordable homes for low-income individuals and families. Energy efficiency and environmental sustainability in these affordable homes is challenging, limited to affordable solutions and broad appeal to residents. Yet efficiency and good environmental quality (thermal comfort, air quality, and natural light) is important for the well-being and economic sustainability of Habitat's residents.

Research began by evaluating three recent designs used by Manhattan Area Habitat for Humanity (MAHFH) for recent homes. Evaluation focused on energy efficiency and natural light. Three-dimensional computer models were built using construction drawings, and were analyzed using whole-building energy modeling: software that estimates energy required for heating and cooling along with the levels of natural light in the spaces. After comparing the three designs, we focused on the home that was recently built: the Crabtree residence. In the spring we evaluated the Crabtree residence in person, collecting observations to provide Habitat and the owner with insights about the real-life performance of the house. We have also compared heating and cooling bills to the results of the computer analysis to better understand how the characteristics of the home compare to the computer model. The research results will help MAHFH to improve the energy performance and environmental quality in future homes, while future research will use these results to provide more direct insight for future MAHFH home designs.

# **Implementation of Thin-film Transducers in Space-suits**

Branden Brown, Dr. Bill Kuhn Department of Electrical and Computer Engineering College of Engineering

This project outlines research on thin ultrasound transducers for use in space-suits. The thin-film transducer will be used in diagnosing shoulder injuries that occur in an astronaut's Neutral Buoyancy Lab (NBL) training exercises. The preliminary research included extensive amounts of literature review. This is a necessity as a deep understanding of the ultrasound system and operation is vital. The literature included scholarly articles based on creating non-traditional ultrasound probes for specific implementation. The review focused on several aspects of the unit including the array, piezoelectric materials, and flexibility, and has concluded that creating all the different aspects necessary for a viable final product is possible. The need to know if a unit can be produced with all these characteristics simultaneously has yet to be concluded. The current state of the project has the construction of prototype underway and testing will commence upon completion. Data and conclusions will be available once in-house testing has been completed and, if possible, the custom transducer will ultimately be tested in a full scale NBL training exercise.

#### **Community Oral History: Theory and Practice**

Amarrah Campbell, Dr. Yolanda Broyles-Gonzalez Department of American Ethnic Studies College of Arts and Sciences

This project explores the history of Black Manhattan, Kansas using Community Oral History theoretical and practical research tools. The goal of the project is to bring forth the knowledge of a people that history books have excluded. History is normally written by the oppressors and the oppressors do not include the full story of the oppressed people. Often, books leave out the knowledge systems of people of color, which include historical knowledge, musical knowledge, medicinal knowledge, spiritual knowledge and practices. This project's goal is to unearth the history of Blacks in Manhattan, Kansas, one family at a time. I will be doing this by recording the oral life stories of Deacon Billy Hill and Deaconess Linnetta Hill. They are one of the first families at Pilgrim Baptist Church here in Manhattan. They have been at the church since they were young, and their families span the 135 year history of that church. They are a rich historical resource and although their histories will be passed on orally within their families and among friends, it is also important to record those oral histories for libraries and researchers.

The overarching research question here is: what do we know about the history of blacks in Manhattan? This question will be answered not only by doing an oral history, but also by integrating existing research about oral history methodology, as well as oral histories conducted in other Black communities. In pursuing this research I will rely on videotape and voice recording these two individuals. That will be followed by the process of transcription, which will bring the materials to a wider readership. We can all learn from what the Hills have gone through in their lifetime, while we enrich archival materials in our library at the same time. This oral history will help open up the rich history of Blacks in Manhattan while also contributing to our understanding of the central role of Black churches within Black history.

**'New Destinations' Immigration, Legislation, and Agriculture in Kansas** Marcus Dominguez, Dr. Alisa Garni Department of Sociology, Anthropology, and Social Work College of Arts and Sciences

As immigration reform stalls at the federal level, debates regarding local and state officials' authority to enforce federal immigration law are becoming more common (and pressing). At the same time, many politicians are pushing to regulate immigration via criminal versus civil immigration systems. Kansas legislators participate actively in these debates, and yet state level policy on immigration remains largely undecided (i.e., they are debating whether to adopt E-Verify and "self-deportation" policies akin to those in Arizona and Alabama or—in line with the Kansas Business Coalition—more inclusive policy to regularize the status of new immigrant employees). Meanwhile, many immigrants have moved to Kansas to work in meat packing plants and, increasingly, in both small and large dairy operations. This raises the question, what is the relationship between changing land use, immigration, and legislation in Kansas? Kansas provides a strategic research site for examining how a mix of fluctuating local, state, and federal policies affect both recently arrived and long-term unauthorized immigrants, as well as how immigration affects farming practices across the state. We are conducting a comparative case study of three adjacent Kansas farms that are similarly affected by immigration legislation. The results of our study may help to shed light on broader economic, political, and demographic changes in other parts of the country.

#### Mia Solé Thin-Film Photovoltaic Array Performance at Variable Temperatures and Substrates

Alan T. Caro, Ruth D. Miller Department of Electrical and Computer Engineering College of Engineering

The purpose of this research is to collect data from copper-indium-gallium-selenide (CIGS) panels to validate current information and compare performance of suspended CIGS panels vs those installed directly on a roof, and vs polycrystalline silicon panels installed at an angle. Mia Solé Flex Series CIGS thin-film solar panels are an emerging series being produced since late 2012. The objective is to test these panels on different substrates and different temperature variations. Thin film solar panels are less efficient than typical monocrystalline/polycrystalline solar panels and more economical to install; however, they are more costly up front. They are designed to be adhered directly to a roof with no racking. Installation of 14 panels suspended on the roof was completed during the 2014 summer; however, we were prohibited from mounting them directly to the roof, and they are instead suspended on a platform above the roof. My specific role in the research is to engineer an experiment/apparatus to record data off a single panel resting on various substrates. The suspended panels are load (potentiometer to control the resistance), and a microcontroller called an Arduino Uno to collect voltages and current. Using this data we will make IV (current to voltage) curves to find Vmpp, Impp and Pmpp. We will compare their energy production with respect to temperature. This data will help determine the economic payback of CIGS vs the more common silicon.

#### Synthesis and Evaluation of Acid-Modified Fe/Fe3O4 Nanocatalysts for the Conversion of Soy Oil and Waste Fat to Biodiesel

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Biodiesel is a nontoxic, renewable source of fuel, and it can be produced from free fatty acids or triglycerides. The current biodiesel production methods require large amounts of water to wash the catalyst. The goal of this project is to synthesize stable, highly magnetic, acid-functionalized Fe/ Fe3O4 nanoparticles that can be used as an acid catalyst in the production of biodiesel, and extend these studies by using waste fat from restaurants or public kitchens, which contain high contents of free acids. The Fe/ Fe3O4 magnetic nanoparticles (MNPs) are synthesized by thermal decomposition of Fe(CO)5 with an average diameter of 15 nm. The MNPs are coated with a silica layer and further functionalized with sulfamic acid groups on their surfaces. A transesterification reaction between glyceryl tristearate and methanol is used as a model reaction for biodiesel synthesis. Previous results have shown that the acid-functionalized MNPs can be used as effective solid acid catalyst to promote biodiesel synthesis. The expected results will show how many times the MNPs can be successfully reused before the product yield decreases. It is expected that the acid on the MNPs will be degraded after each reaction which after a number of reactions, the product will not have the quality as the first few reactions. After all, re-usability of the catalyst is the essence because biodiesel has to be produced economically.

# Higher education teaching and learning centers' participation with and uses of Twitterjcal\_449

Denise Durham, Roger McHaney Department of Managment College of Business Administration

Teaching and learning centers (TLCs) in higher education institutions participate in online social networks for a variety of purposes. In addition to communicating relevant information about activities sponsored by the center, a particularly germane goal can be to promote learning. Within a social network, learning can be participative and contribute to digital identity formation through networking, engagement, and contribution to collective knowledge. Current literature describes best practices for centers of teaching and learning. However, a gap exists regarding empirical research describing centers' use of online social networks to further their organizational missions and promote teaching and learning. The purpose of this paper is to understand centers for teaching and learning in representational practices in social networks in general, and on the microblogging platform Twitter specifically. In particular, this paper investigates Tweets sent out by Big XII University TLCs. These Tweets were analyzed both quantitatively and qualitatively to arrive at archetypical uses and themes that describe online microblogging, social network practices. Preliminary findings indicate TLCs using Twitter: (1) shared information, resources, and media relating to their professional practice (55% of Tweets); (2) advertised events and workshops (25% of Tweets); (2) shared information about classroom practices and teaching tips (7% of Tweets); and to lesser degrees: engaged in social commentary, worked to develop digital identities, sought to make connections with others, highlighted participation in online networks, interacted with other TLCs, and highlighted achievements. These findings help further understand ways a TLC can interact with constituents in today's increasingly interconnected world.

# Hexagrid Puzzles

Denisse Dominguez, David R. Auckly Department of Mathematics College of Arts and Sciences

Mathematical puzzles help students gain skills that help solve mathematical problems. These skills can be used every day in the classroom or simply to find ways to solve different types of puzzles. The purpose of this project is to work out different types of mathematical puzzles and create new ones. Several articles explain the importance of mathematical puzzles and the effects they have in classrooms. A number of logic puzzles were analyzed, then the fraction snake was solved. Slight variations of the snake puzzle were created. Then several Slitherlink puzzles were solved. An interesting variation of the Slitherlink puzzle was created in a hexagonal grid. Several of these hexagonal grid puzzles were created and solved by hand. The next step of the project is to write computer code to solve the hexagonal puzzles. The computer code uses integer programming techniques and will be implemented in MATLAB. After the computer software is verified, it will be used to test random configurations to see if they are solvable puzzles with a unique solution.

#### Evaluation of CXCR4 Expression by Mouse Neural Stem Cells Miriam Macedo, Tej Shrestha, Sivasai Balivada, Deryl. L Troyer Department of Anatomy and Physiology College of Veterinary Medicine

CXCR4 is a chemokine receptor found on many cell surfaces including leukocytes, hematopoietic cells, epithelial, and endothelial cells. These chemokine receptors are believed to help cell migration towards various tumor cell types including glioma cancer cells. Some neural stem cells (NSCs) have subpopulations that express CXCR4, which can be beneficial for targeted cell-based therapy by loading a therapeutic drug into NSCs and systematically injecting to target cancer cells. Our study was to find the expression label of CXCR4 on mouse NSCs and to attempt upregulation of the chemokine receptor expression with the addition of Interleukin-10 cytokine (IL-10). The expression levels of CXCR4 were first compared in mouse NSCs and a CXCR4 positive control human lung carcinoma cell line (A549) without IL-10 treatment using Immunoflow cytometry. Immunoflow cytometry uses markers such as CXCR4 primary and secondary antibodies to target and locate the expression label CXCR4 on the cell surface. Minimal expression was found on NSCs compared to A549 cells. Next, NSCs were incubated with IL-10 treatment (50 ng/ml) added every day over a five-day period after which CXCR4 receptor expression levels were evaluated using Immunoflow cytometry. The expression labels between untreated NSCs, IL-10 treated NSCs, and A549 cells were compared and the presence of CXCR4 was found to be minimal before treatment of IL-10 and showed no change after IL-10 treatment.

# Arm and Calf Blood Pressure Changes after Physical Activity

Norma Varona, Margaret Rys Industrial and Manufacturing Systems Engineering College of Engineering

The foot is an extremely complex part of the human body. The foot is composed of a variety of muscles, tendons, ligaments and bones. Our foot plays an essential part in falling. Understanding how the foot affects standing and walking is fundamental to determining the potential for falling. In order to investigate how the foot affects falling, a study was conducted. The purpose of our study was to determine whether there was significant difference in ankle and arm pressure due to physical activity. Twenty young adults participated in the study. Their blood pressure was measured in the arm and the ankle before and after exercise. The Panasonic Automatic Blood Pressure Monitor and the CONTEC Pulse oxymeter were the devices used to measure the arm and ankle pressure and the pulse. All the readings were obtained at intervals of no longer than 1 minute. A total of 400 data points were obtained. The readings of diastolic and systolic pressure, pulse and oxygen were averaged and the data was graphed. Percent differences of the before and after readings were also calculated. Results showed that there is a considerable difference in the ankle and arm pressure before and after exercise. When physical activity was conducted the systolic pressure went up considerably and the diastolic pressure decreased minimally. Pulse, as expected, increased considerably with exercise.

# Cognition, Creativity and the Embodied Mind with Emphasis on Architecture and the Millennial Generation

Samantha Estabrook, Ryadi Adityavarman Department of Interior Architecture and Product Design College of Architecture, Planning and Design

Current millennial students have detachment due to excessive influence and usage of digital technology. The study investigates the concept of the philosophical connection between body and mind, and creativity in design education, with emphasis on the millennial generation. Students are exhibiting learning difficulty from their disconnectedness, such as: difficulty to focus and the inability to think holistically. In order to gain a complete understanding, the research via literature review, spans over four areas of study: cognitive learning, the embodied mind, the millennial generation, and the implementation of embodied design sensibility in modern architecture education. By collecting data from current millennial architecture students, there is a comparison between how these students are perceived to learn and how the students view their learning.

#### The expression of Cytokines in Human Umbilical Cord Mesenchymal Stromal Cells (UC-MSCs) after activation

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The preparation of Human Umbilical Cord Mesenchymal Stromal Cells (UC-MSCs) for clinical applications might be refined by analyzing their cytokine expression. An ELISA assay will be used to quantify the release of Galectin-3, IDO, PGE2, TSG- 6, and other cytokines known to mediate the immunomodulatory effects of US-MSCs. The expression will be measured before and after various experimental manipulations to adjust their potential clinical effect. The results will compare four biological replicates of UC-MSC isolates, two male and two female, with four stimulants: Lipolysaccharide (LPS), Polyinosnic: polycytidylic acid (Poly (I:C)), Interferon- $\gamma$  (INF- $\gamma$ ), INF- $\gamma$  with Tumor Necrosis Factor- $\alpha$  (TNF- $\alpha$ ), and a control (no stimulant). After one hour of exposure to stimulation or control medium, the plates are washed and replaced with fresh media. Twenty-four hours later, the medium is collected and the cytokine content measured is by ELISA. These results will inform future, more complex and defined ELISA projects, and can be evaluated in a preclinical inflammatory bowel disease model for clinical potency.

# Importance of Spanish Song Study in Vocal Music Education

Sharon Wilson, Dr. Amy Rosine Department of Music, Theatre, and Dance College of Arts and Sciences

In my project, Dr. Rosine and I are researching voice students studying Spanish classical music at different points in their education. We are studying these effects because we are curious why students do not study Spanish classical music more when Spanish is studied commonly in middle school and high school. We are taking several students, male and female, ranging from a sophomore in high school to a graduate student at Kansas State University. We will observe how each responds to the music and what their weaknesses and strengths are while they are learning their pieces in their lessons with Dr. Rosine. Each subject will fill out the same survey describing their experiences with Spanish classical music (past and present) and what their opinions are in regard to the style. I am also researching three popular Spanish Classical music composers, Manuel De Falla, Enrique Granados, and Joaquin Rodrigo in order to have a greater knowledge of the music and their compositions. The results we are expecting are the younger students are more intimidated of the Spanish music then the older singers. The belief is at first glance Spanish classical music can be overwhelming and frustrating because of the compositional elements: complicated piano arrangements, short melodic lines, difficult Spanish diction, and emotional songs that are challenging to understand at a young age.

### Effects of Sorghum Processing on the Efficacy of Feed Grade Enzyme for Broilers

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Sorghum is a grain that can be used for both human and livestock consumption as an alternative to corn. Research and education can be used to promote sorghum as a substitute for corn by building science and industry around sorghum where opportunities can create entrepreneurial advances. The poultry industry is unique in that it offers the highest turnover rate and the quickest returns to investment expenditure in the livestock market. Sorghum is an excellent feed for poultry but is slightly less digestible. Some proteins have been found to be damaged during processing, thus reducing the bioavailability of some nutrients. Return on investment can be improved by turning out the broilers in a better efficient rate.

The study conducted was to determine how processing impacts the interaction between added enzymes and processed feed. In order to recommend a level of applicable enzyme substrate target to give the best return on growth and performance, it is important to understand how processing affects the performance of the enzymes. Four hundred and thirty-two Cobb 500 day old broiler chicks were obtained and assigned to 4 batteries with 18 pens per battery for a total of 72 pens with 6 birds per pen. One ton of starter feed was acquired, with 1000 lbs. being in mash form, and the other 1000 lbs. being the processed, pelleted, dried and then ground into a mash form. Five enzyme treatments were used: 1) none, 2) amylase, 3) protease, 4) amylase + protease, and 5) broad spectrum enzyme mix. Thus 2 feed forms and 5 enzyme types were used for a total of 10 treatments and were randomly assigned to pens. It is expected that adding enzymes to processed sorghum feed will have an effect on conversion, growth, and performance. A second study is underway to gather more data and await the results to conclude the expectations.

### **Pharmacokinetics of Terbinafine in Horses**

Izabella Carmona<sup>1</sup>, Dr. Butch KuKanich<sup>2</sup>, In collaboration with Dr. Elizabeth Davis<sup>3</sup> and Dr. Jarrod Younkin<sup>4</sup> <sup>1</sup>Department of Animal Sciences and Industry College of Arts and Sciences <sup>2</sup>Department of Anatomy and Physiology <sup>3</sup>Department of Clinical Sciences College of Veterinary Medicine <sup>4</sup>Veterinary Health Center

Options for oral treatment of fungal infections in horses include fluconozale, itraconazole, voriconazole (azole antifungals). These drugs are costly (\$180-320/day). The only azoles that have activity against the Aspergillus species are itraconazole and voriconazole. Terbinafine (Lamisil) is an allylamine antifungal drug, used to treat fungal diseases in people, but has been used in veterinary medicine and may be efficacious against the following fungal species: Candida albicans, Malassezla pachydermatis, Blastomyces dermatitidis, Cryptococcus neoformans, Histoplasma capsulatum, Microsporum canis, and Aspergillus species. Terbinafine works by inhibiting ergosterol by inhibiting squalene epoxidase.

The goal of this project is to establish a feasible and economical option for treating fungal infections in horses. The purpose of this study is to evaluate terbinafine in the adult horse at a dosage of 30mg/kg given via oral and rectal routes to achieve required concentrations above the MICs of all Aspergillus species. Terbinafine is a more affordable drug for use in horses. We hypothesized that dosing the drug rectally will give us the highest plasma concentrations, therefore being the most effective route. In the pilot study, we dosed 30mg/kg rectally suspended in water or olive oil. We also dosed 30 mg/kg orally both with and without dosing cimetidine one hour prior to administration. Initial results suggested oral terbinafine with cimetidine achieved the highest maximum plasma concentration relative to the other treatment groups. Cimetidine is known to inhibit drug metabolism which may be the reason for the higher drug concentrations. Further data on oral terbinafine with and without cimetidine are being collected.

#### Gas Phase Infiltration of Carbon Nanotubes in Nickel Nanofoam for Improved 3D Electrode Performance in Lithium-Ion Batteries

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Next generation Li-ion batteries (LIBs) require higher energy and power densities. The use of 3D nanostructured electrodes can significantly increase the rate of Li insertion and removal due to the short transport distances for Li ion within the 3D nanostructure. Further, the higher surface area associated with 3D nanostructured electrodes permits a high contact area with the electrolyte and consequently increases the Li-ion flux, while the improved porosity decreases volumetric stresses during cycling. Ni nanofoams are the state-of-the-art current collectors in LIBs due to their high stability, mechanical robustness, porosity, and the highly conductive 3-D framework that can be coated with high capacity active materials such as SnO2. However, their extremely high porosities (> 99%) and limited specific surface areas (< 5 m2/g) limits the amount of active electrode material that can be deposited, consequently reducing the maximum achievable areal energy density. Here, we show, for the first time, a scalable gas-phase liquid injection chemical vapor deposition (LI-CVD) process for the infiltration of arrays of high-quality CNTs in Ni nanofoam. Importantly, the new process allows for the improvement of the BET specific surface area of Ni nanofoam by a factor of over 20 without compromising the structural integrity of the foam. Upon deposition of SnO2 on CNT-infiltrated Ni nanofoams by atomic layer deposition, the new nanocomposites show improved areal capacity and excellent rate capability as well as high capacity retention.

# **Natural Hazards on Buildings**

Michael Cesena, Bill Zhang Department of Architectural Engineering and Construction Science College of Engineering

Natural hazards affect hundreds of thousands of buildings in the United States every year. The most damaging hazards are earthquakes, hurricanes, and tornados. The purpose of this research was to investigate how much damage natural hazards are doing to buildings, how buildings fail because of natural hazards, and if there are recent construction methods and building technology that will limit the damage that natural hazards cause on buildings. The research consisted of literature analysis of journals and other references regarding natural hazards. Among them were reports of building damage and failure, and resistance to hazard events such as the Joplin, Missouri tornados and the Northridge Earthquake of 1994. After analyzing the data on natural hazards and their effects on buildings, we found that the damage done to buildings by natural hazards largely stems from the connections of different parts of the building, and one connection malfunction generally led to the failure of the building or caused major damage to it. Comparing statistics of recently used construction and building engineering technology to those used a few decades ago, we concluded that special moment frames, reduced beam sections (RBS), and multiple hurricane fasteners are improvements in building engineering and construction that would greatly reduce the amount of damage caused by natural hazards.

#### 15 deoxy-PGJ2 Stimulates Porcine Vas Deferens Epithelial Anion Secretion via EP2/EP4 Receptors

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The male reproductive tract expresses critical components for the synthesis of both prostaglandin (PG) D2 and PGE2. Importantly, expression of the enzyme catalyzing the rate-limiting step in PG synthesis, PGHS2, is induced by testosterone. Thus, we speculated that PGE2 and/or PGD2 contribute to reproductive tract development and that PGs likely play key roles in reproductive success. A previous report showed that both PGD2 and PGE2 stimulated short circuit current (Isc), a sensitive indicator of anion secretion, across cultured pig vas deferens epithelial cells via cognate receptors, DP2 and EP2/EP4. We also observed that 15 deoxy-PGJ2 (15d-PGJ2), a product of the spontaneous dehydration of PGD2, stimulated Isc, but only at high concentrations. Thus, experiments were conducted to determine the receptor subtype(s) that mediate the effect of 15d-PGJ2. These experiments were carried out with cultured primary adult pig vas deferens epithelial (1°PVD) cells and immortalized PVD9902 cells using a modified Ussing style flux chamber. Acute exposure to PGD2 caused a rapid and sustained increase in Isc in 1°PVD cells, but produced a smaller and less consistent response in PVD9902 cells. Regardless, the effects of PGD2 were attenuated by BW A868C, a DP2 blocker, while BW A868C had no effect on the response of PGE2, as was observed previously. 15d-PGJ2 elicited a robust response in 1°PVD cells that was not affected by BW A868C. These results suggest that although 15d-PGJ2 is a dehydration product of PGD2, the stimulation of Isc by 15d-PGJ2 is independent of the DP2 receptor and is more likely mediated by the EP2/EP4 receptors that are affected by PGE2. Further, the results demonstrate that there are fundamental differences in the responsiveness of the immortalized cell line, when compared to primary cell cultures. This investigation identifies the best in vitro model system to use for subsequent studies that will focus on PG regulation of ion transport during duct development and ultimately to identify interventions that may circumvent cystic fibrosis related anomalies in the male reproductive tract.

African American Women in Media Erwin Mwangi Chege<sup>1</sup>, Dr. Nadezada Shapkina<sup>2</sup> <sup>1</sup>Department of Managment and Business College of Business Administration <sup>2</sup>Department of Sociology, Anthropology, and Social Work College of Arts and Sciences

African American women have historically been assigned stereotypical roles in the media. With all the progress that has been made addressing race relations, this research sought to analyze how African American women are now depicted in modern media programming. The research analyzed a sample of three recent forms of media: film, television, and online programing. These programs were: "Madea's Big Happy Family," "How to Get Away with Murder," and "Orange is the New Black." Results from the analysis show that while black women have recently become more visible in the media, their roles are mainly negative representations of black women. All three programs have a strong presence of black female characters and while these programs emphasize the positive sides of these black women in order to empower them, often they are depicted as caricatures and stereotypes, which ultimately contradicts their previously established empowering roles. These research findings indicate that the pace of change in the media industry has failed to catch up with current progressive standards concerning black women. The findings also indicate that current representation negatively impacts black women through reduction of self-esteem and self-worth, as well as negatively impacting society's views of black women.

#### Visual Cues and Outcome Feedback Influencing Physics Problem Solving in an Online System

Jeffrey W. Murray, Nandana Liyanage, N. Sanjay Rebello Department of Physics College of Arts and Sciences

Online learning systems are becoming increasingly ubiquitous in education today. We conducted a study which explored the use of visual cues and outcome feedback to enhance the learning experience of students in an online environment. The study builds on previous research, which demonstrated the effectiveness of visual cues and feedback to improve physics problem solving. N = 164 students enrolled in an algebra-based physics class at a large Midwestern university completed a sequence of conceptual physics problems in an online environment. This was a 2x2 between subjects design with two of the groups of participants receiving visual cues and two not receiving cues; and two of the groups receiving outcome feedback and two not receiving feedback. We analyzed the effect of the cues, feedback and their combination on the correctness of students' responses to the online questions. We discuss the comparison of the performance of students in the four conditions and the implications of the study for online learning systems.

This work is supported in part by U.S. National Science Foundation grant 1348857.

#### **Factors Associated with Different Forms of Cyberloafing**

Dominic Deleon<sup>1</sup>, Brian Niehoff<sup>2</sup>, Joseph Ugrin<sup>1</sup> <sup>1</sup>Department of Accounting College of Business Administration <sup>2</sup>Department of the Provost

The internet has affected business operation more than perhaps any innovation in the past century. It has improved the workplace in many ways by being a new platform for business to operate, employees to communicate, and customers to shop. In addition to those effects, the internet also gives employees a new domain in which to misuse company time. Use of the internet for non-work related activities in the workplace has become increasingly more common and businesses have expressed concerns about lost productivity due to personal internet usage (cyberloafing). However recent research has found that some types of cyberloafing can serve as a 'break' and can actually have a positive impact on employee job performance while other types of cyberloafing are purely detrimental. With that in mind it seems important to know how employees spend their time online, why they spend their time online in the way they do, the effects of that time online, and the usefulness of mechanisms that aim to influence online behavior in the workplace. This research will explore how different meanings of the cyberloafing may be presented to employees spend their time online. This study provides evidence regarding the amount of time office workers spend on a number of common types of cyberloafing.

#### Expression Analysis and Immunoreactivity of Rift Valley Fever Virus Gc Glycoprotein

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Rift Valley Fever virus (RVFV) is a mosquito-borne zoonotic pathogen that belongs to the genus Phlebovirus of the family Bunyaviridae. In ruminants, RVFV causes a high rate of spontaneous abortion and neonatal mortality, whereas infections in humans are often characterized by febrile illness that in some cases can progress to more severe disease, including hemorrhagic fever, blindness, and neurological disorders. While RVFV has been mainly reported in Africa, introduction into the US carries a potential risk due to the presence of competent vectors. The genome of RVFV is composed of three negative-stranded RNA segments, small (S), medium (M), and large (L). The S segment encodes the nucleocapsid (N) protein, which makes up the basic structure of the virus and the M segment encodes the C-terminal and N-terminal glycoproteins. Gn and Gc, which form sub-unit structures on the surface of the viral envelope. The structural proteins Gn, Gc and N (encoded by S segment) are targets for host antiviral immune response. The primary objective of this study is to determine the performance of a modified truncated version (where the transmembrane and cytosolic domains have been deleted), of the Gc glycoprotein (Gc ectodomain, Gce) compared to full-length Gc as a potential target for immunodiagnostic assay development. The Gc ectodomain was amplified by PCR using target-specific primers and then cloned into pFastBacCTopo plasmid, to create a donor plasmid, pFastGce. This plasmid was used to create a recombinant bacmid for rescue of recombinant baculovirus in Spodoptera frugiperda, Sf9, insect cells. Expression of Gce and other RVFV structural proteins, N and Gn, was accomplished using the respective recombinant baculoviruses. Analysis of the immunoreactivity profile of Gce glycoprotein by western blot and enzyme-linked immunosorbent assay (ELISA) using anti-sera (from sheep experimentally infected with wild type RVFV) and a panel of anti-RVFV Gc monoclonal antibodies demonstrated an immunoreactive profile similar to the full-length version of the protein. These results indicated that truncated Gce could serve as a useful diagnostic antigen for monitoring RVFV infection/vaccination, as well as a potential target for vaccine development.

#### Variation in water quality between urban and rural portions of Wildcat Creek

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The overall goal of this study is to examine controls on water quality over time in urban and rural reaches of Wildcat Creek. Understanding controls on water quality in streams such as Wildcat Creek is important because it will help us manage negative impacts of human activities. Starting in June 2014, we collected water samples periodically from the creek channel at five sites: three rural and two urban. We also collected water from a natural tributary in the rural area and a storm sewer drain in the urban area. We measured temperature, conductivity, and pH in the field using a portable meter. In the lab, we analyzed samples for alkalinity using titrations and solute concentrations using ion chromatography. Our findings reveal considerable differences in water chemistry between urban and rural sites. Compared to urban sites, rural sites tended to have lower pH and chloride concentrations but higher alkalinity, calcium, nitrate, nitrite, and phosphate levels. We interpret differences in chloride concentration to arise in response to road salt application in town. Consistent with this interpretation, differences in chloride levels were highest in samples collected during late fall and winter. Chloride concentration averaged 19.8 and 49.6 mg/L in samples collected from rural and urban areas, respectively, during the June-October. Since early November, however, chloride concentration has averaged 26.2 and 148.5 mg/L in samples collected from rural and urban areas, respectively. Agricultural activities in rural areas likely contribute to differences in concentrations of nutrients (nitrate, nitrite, and phosphate) between urban and rural sites. Nutrient levels were highest in samples collected in June at rural sites (up to 18.4 mg/L nitrate, 1.2 mg/L nitrite, and 2.8 mg/L phosphate). However, analysis of tributary waters (natural and storm sewer) indicates that significant nutrient inputs occur in both urban and rural areas throughout the year.

### **Regenerative Potential of Human Umbilical Cord Mesenchymal Stromal Cells**

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As cells expand in tissue culture (in vitro), their ability to continue to divide declines and the cells may enter a senescent stage and slow or stop growing. Additionally, when cells in culture are stressed they may enter senescence. We are developing protocols to expand umbilical cord derived mesenchymal stromal cells (MSCs) for clinical trials. One important piece of characterization data is to know the regenerative potential and senescence of the cells. Here, I developed a cell based fluorescent assay to determine senescence in our MSCs. I used oxidative stressors, hydrogen peroxide and ethanol, to artificially increase senescence in our culture cells as a positive control and early passage cells as a negative control. I evaluated that accumulation of the acidic enzyme, beta-galactosidase, when visualized by a fluorescent substrate to observe the presence of the beta-galactosidase. The percentage of senescent cells can be calculated by counting the number of cells staining for beta-galactosidase and the total number of live cells and the percentage of senescent cells recorded. I plan to study the percent of senescent MSCs grown in planar (2D) and the percentage of senescent cells in 3D culture to ascertain whether 3D culture increases the number of senescent cells due to aggregation. Thus, we can optimize the health and usefulness of MSCs for clinical use.

#### Electrochemical Characterization of 3D Nanocarbon-Based Electrodes for High-Performance Lithium-Ion Batteries

Jenae Tate, Placidus B. Amama Department of Chemical Engineering College of Engineering

Portable electronic devices are negatively impacted by energy and power density limitations of current lithium-ion batteries (LIBs). Architectures or materials for faster ion and electron transport are required. 3D carbon nanotubes (CNTs) or/and graphene are widely used as anode materials in LIBs. However, the optimum morphology and surface chemistry of 3D nanocarbon structures that are required for high ionic diffusion, low irreversible capacity, and stable solid electrolyte interface (SEI) layers are not well understood. In this study, the electrochemical behavior of nanocarbon-based electrodes have been investigated using cyclic voltammetry and impedance analysis. The results have provided new insights into the redox reactions occurring during cycling and in particular, the Li intercalation and SEI formation processes.

### Development of an assay to detect African Swine Fever Virus specific antibodies

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African Swine Fever (ASF) is an economically important foreign animal disease affecting both domestic swine and wild boar. Infection with ASFV results in antibodies that are directed towards major surface protein such as p30, p54, and p72. Due to the potential for high production loss and trade restrictions, swift and accurate laboratory diagnostics are essential in reducing the risk of virus transmission. Current cell culture based assays for measuring antibodies specific for ASFV rely on virus infected cells. The objective of this study was to develop a non-virus based assay to detect antibodies to ASFV. The surface proteins, p30, p54, and p72 were amplified and cloned in frame into the pEGFP:N1 vector, which codes for the G418 antibiotic resistance gene. The clones were then transfected cells were then fixed and permeabilized with acetone. An indirect fluorescent antibody assay (IFA) was then performed with porcine antibodies specific for individual ASFV surface proteins. IFA results showed that transfected cells expressed the respective ASFV surface proteins. Current efforts are directed at growing cells in the presence of the antibiotic G418 for the purpose of creating stable cell lines that express the ASFV surface proteins p30, p54, and p72.

# **Propensity versus Prototypes: Factors that Influence Attributions to Prejudice**

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Reactions to the fatal shooting of Michael Brown in Ferguson, Missouri illustrate that people disagree on whether or not racial prejudice is present. In the present research we tested competing hypotheses about whether perceivers' prototypes about prejudice or attributional tendencies have a greater effect on attributions to prejudice. The observer-tendency hypothesis predicts that observers' tendencies to make attributions to prejudice are affected by their beliefs and expectations about prejudice (Miller & Saucier, 2014). Alternatively, the target-prototype hypothesis predicts that observers will see prejudice more often in prototypical situations (e.g., Whites targeting Blacks) than non-prototypical situations (e.g., Blacks targeting Whites; Inman & Baron, 1996).

To test these hypotheses, 196 college students (108 females, 88 males) completed the 15-item Propensity to Make Attributions to Prejudice Scale (PMAPS; Miller & Saucier, 2014) to assess their beliefs and expectations about prejudice. Items such as I am quick to recognize prejudice were rated on a scale from 1 to 9 (1 = Strongly Disagree, 9 = Strongly Agree). Participants also watched a video containing a microagression (e.g., a White person refusing help from a Black person). Race of the target and perpetrator were manipulated for both situations. Participants then completed six items measuring their attributions to prejudice.

Consistent with the observer-tendency hypothesis, PMAPS scores were positively related with attributions to prejudice. However, no support was found for the target-prototype hypothesis. These data suggest beliefs and expectations about prejudice matter more in making attributions to prejudice than the race of the parties involved.

#### Effect of Indole-3-Carbinol on Gap Junction Intercellular Communication in Colorectal Cancer Cells

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Indole-3-Carbinol (I3C) is a phytochemical found in cruciferous vegetables such as broccoli, Brussel sprouts, cabbage, cauliflower, kale, and mustard greens. Previously, I3C has been recognized as a possible prevention agent against breast and colon cancer. However, the effect of (I3C) on gap junctional intercellular communication (GJIC), a hallmark of cancer formation, is unknown. Thus, the goal of this study is to determine the effect of I3C on GJIC in colorectal cancer. The approach is to use human colorectal cancer, CaCo-2, cell as a model as well as using technique of GJIC, known as scrape load/dye transfer (SL/DT) assay. Cells were treated with 10-1,000  $\mu$ M of I3C for 1.5 hours. SL/DT assay was performed and the results showed that 10  $\mu$ M I3C, incubated for 1.5 hours, caused a 100% reduction in GJIC compared to the control and or solvent alone. Currently, GJIC inhibitors and enhancers are used to assess the baseline of GJIC activity in CaCo-2 cells and subsequently compared to I3C. The outcome of this study will provide whether I3C plays a role in the regulation of GJIC and modulates cancer formation.

#### Functional Characterization of a Baculovirus Gene with Homology to Intron-encoded Endonucleases on Virus Replication

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The Autographa californica M nucleopolyhedrovirus (AcMNPV) open reading frame 79 (ac79) is a gene conserved in most baculoviruses, large DNA-containing viruses that infect insects. ac79 has homology to genes encoded by bacteria, ascoviruses, and iridoviruses. The predicted ac79 product, Ac79, has a conserved domain that is homologous to UvrC or intron-encoded endonucleases; these gene products hydrolyze DNA and, upon DNA repair, the gene is copied at that site. Characterization of a recombinant virus lacking ac79 showed that deleting ac79 resulted in a decrease of infectious progeny virus, suggesting that ac79 is necessary for efficient virus replication. Three viruses with site-directed mutations within the predicted UvrC domain were constructed. Characterization of these mutants showed that only one had a phenotype similar to that of the ac79 deletion virus. We hypothesized that viral constructs were recombining with other parts of the genome that remained and nucleocapsid formation, we constructed new UvrC domain mutants that were unable to recombine with other parts of the viral genome. We are now characterizing if these mutations and the UvrC motif have an effect on virus replication. These results will better define strategies used for virus multiplication.

# The chemistry of sex games: Why do male crickets transfer large amounts of dopamine to females during copulation?

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Dopamine is an important biological molecule that plays a critical role in how behaviors are "punished" or "rewarded." And while dopamine has been studied with regard to a wide range of behaviors, including memory, diet and addiction, it has previously not been found to be transferred from one individual to another during copulation. However, the ejaculates of male ground crickets (Allonemobius socius) can contain up to 100pg of dopamine, which is roughly 10X the normal physiological dose required to modify behavior in insects. So, the question is, why are male crickets transferring so much dopamine to females during sex? There are several alternative hypotheses, derived from sexual selection and sexual conflict theory, which may explain the function of dopamine as an agent of sexual reward or punishment, respectively. Our preliminary data suggest that dopamine acts as a punishment, whereby the greater the amount of dopamine transferred to the female, the longer it takes for the female to re-mate. As a consequence, females receiving larger doses of dopamine are likely forced to store and utilize more of that male's sperm relative to a female who receives smaller amounts of dopamine. This "punishment" effect is particularly strong when a female re-mates with a different male. While further experiments are needed to clarify the role of dopamine in the chemistry of cricket sex, our data suggest that sexual conflict over mating rates may be driving the evolution of dopamine usage as a sexual punishment in this system.

# The Effect of Cryopreservation Storage Time and Freezing Extenders on Rat Sperm Cryosurvival Rate

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Cryopreserved rat sperm allows perpetual access to desired genetic distinguished strains without any restrictions in housing facilities, animal regulations, and geographical transportation. However, its susceptibility to various environmental stresses demands a profoundly refined technique of cryopreservation; and thus no established methods exist currently. In this study, we examined the effect of cryopreservation storage time and freezing extenders on rat sperm cryosurvival rate. The storagetime factor was studied by cryopreserving rat sperm collected from five 22 to 24 weeks old SD rats via modified Nakatsukasa's protocol in liquid nitrogen for 4 days, 2 weeks, or 8 weeks. At each time interval, four straws were randomly selected from the 12 in storage and thawed in the absence of freezing extender. Subsequently, to examine the effect of freezing extenders, sperm from ten other 18 to 47 weeks old SD rats was collected via either modified Nakatsukasa's protocol or modified Yamashiro's protocol and frozen in liquid nitrogen for seven days. Cryopreserved sperm was then divided into three thawing groups and thawed in either modified Kreb's Ringer bicarbonate (mKRB) freezing extender, modified Rat 1cell embryo culture medical (mR1ECM) freezing extender, or absence of freezing extender. All collected data was manually evaluated by counting moving sperm in video obtained at 10x magnification.

# Analyzing the expression of NR2B: The role of the amygdala and hippocampus in the acquisition of fear in differentially reared rats

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Different living environments affect learning in various ways. In rats, an enriched rearing environment has been shown to improve learning on many tasks. However, this may not be the case in a Pavlovian fear-conditioning paradigm as isolated rearing environments increase the rate of fear acquisition to an aversive stimulus. The NR2B subunit of the NMDA receptor has been found to play a significant role in the acquisition of fear. The purpose of this study was to understand the neurobiological effects the rearing environment has on fear acquisition by evaluating the expression of the NR2B subunit in three brain regions important for the learning of fear: the basolateral amygdala (BLA), the central nucleus of the amygdala (ACe), and the CA3 region of the hippocampus. The rats were reared in an isolated, enriched, or standard condition for 30 days. They then had one session of Pavlovian fear conditioning and then their brains were removed and processed to assess the expression of NR2B. We hypothesized that the isolated rats would acquire fear to the stimulus faster than the enriched rats. Our results support this hypothesis as the isolated rats did begin to acquire fear faster than the enriched rats. We also hypothesized that the isolated rats would have greater expression of NR2B in the amygdala and hippocampus. While we are still analyzing the hippocampal data, the results within the BLA revealed that the enriched rats expressed the greatest amount of NR2B while there was no effect of the rearing environment on expression within the ACe. These results suggest that differential rearing alters NR2B expression and the acquisition of fear. Taken together, these results will allow us to further understand how the rearing environment alters the neurobiological mechanisms for fear and could help with the development of treatments for those who suffer from anxiety.

#### Moderate to Vigorous Physical Activity between the Early, Middle and Later portions of Recess Sessions among Preschool-Aged Children

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Background: Many children do not meet the recommendations for daily physical activity. Children spend a large portion of their day at school and it is essential to determine how to help them be more active. Previous research has demonstrated that children's physical activity levels may decrease as time goes on within active recreation sessions such as recess. It is unknown whether preschoolers show this pattern or not. Preschool recess lengths can significantly vary from 15 minutes per session to over 60 minutes per session. The purpose of this study was to determine whether children were more active during the early, middle or late portion of recess. It was hypothesized that children would be more active during the early portion of recess than the middle or late. Methods: A total of 12 sessions, each with 3-9 children were analyzed. Actigraph GT1M activity monitors were placed on the hip of children who participated in this study. Data were collected during morning recess. Results: Overall, children were active at a moderate to vigorous intensity about 1/5 of the time (mean = 19.6%, SD= 17.1%). There were no statistically significant differences in MVPA across recess segments. During the early portion children spent 19.1% of their time in MVPA; 95% confidence interval (CI) = 15.0% to 23.2% compared to 19.6% during the middle portion; 95% CI = 15.4% to 23.8% and 20.1% during the late portion of recess; 95%CI = 16.6% to 23.5%. Discussion: The data did not support the hypothesis that children would be more active during the early portion of recess compared to the middle or end. The children were similarly active during the early, middle and late portion of recess. Future studies should focus on other determinants of physical activity. Childcare centers should continue to help children meet physical activity recommendations by providing their students with long durations of recess sessions.

# What influences incubation behavior and nest success in Grasshopper Sparrows (Ammodramus savannarum)?

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For many animal species, parental care is an important factor affecting offspring survival. Different species evolved different strategies for protecting their young. Most birds incubate eggs and brood young in nests to shelter them from heat or cold, and hide them from predators. For ground-nesting grassland birds inhabiting regions of variable climate, we expect strong selection on incubation behavior. Yet, factors that shape variation in this behavior are relatively unknown. We studied Grasshopper Sparrows breeding on Eastern Kansas' Konza Prairie to (1) determine the temporal and environmental conditions under which nests failed, (2) whether nest failure was random with respect to those variables and nest orientation, and (3) whether nest characteristics, land management regime, offspring age, or time of day influence female incubation behavior. We searched for and monitored Grasshopper Sparrow nests, noting orientation of nest openings. We placed "iButton" data loggers in nests and paired non-nest locations to collect temperature data every 10 minutes to characterize incubation behavior and the timing of nest failure. We considered a female to have left the nest ("offbout") if nest temperature dropped by 1.5°C between measurements, or dropped consecutively over 3 measurements. We found 117 nests in 2014 and analyzed iButton data from 40, 24 of which failed prior to chicks fledging. More nests failed in the daytime than expected by chance, implicating diurnal predators like snakes or birds, but the risk of nest failure was not related to other measured variables. Nests were non-randomly oriented (mean 82°), but orientation was not related to offbout duration. Off-bout duration was related curvilinearly to ambient temperature and varied with nestling age, with the longest off-bouts at high and low temperatures and occurring during peak nestling growth rates. Our results suggest that in grassland birds, climatic variation and foraging demands shape parental behavior, but that predator activity is more important than variation in parental care in shaping nest success.

#### **Transcriptome Analysis of Cells Sensitive and Resistant to Macrophage Cytotoxicity** Delia Hernandez, Stephen K. Chapes

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Macrophages can recognize and kill pathogens and tumor cells. They have several mechanisms by which they can do this: direct contact-mediated killing, growth inhibition, and macrophage-mediated antibody-dependent cellular cytotoxicity. If a macrophage cannot recognize and bind tumor cells then the tumor cells will continue to grow and proliferate. The Chapes laboratory created two cell lines from SV40- transformed tumors that had incorporated SV40-T antigen. T antigen is an oncogene that is present in tumors and can convert normal cells to tumor cells. The two cell lines created were F5b and F5m. At some point, a spontaneous mutation occurred that changed the susceptibility of F5b; it made them susceptible to killing. Studies in the Chapes lab demonstrated that F5b was bound and killed by macrophages through a contact-dependent process. F5m was resistant to being killed by macrophages.

Transcriptomes are collections of the mRNA molecules that are synthesized from DNA. By assessing the transcripts present in a cell it will tell us what genes are being actively expressed and help to understand the signaling pathways active in the cell. The Chapes laboratory is examining the transcriptome of F5b and F5m cells using the Affymetrix Platform. The objectives of the study was to examine how the genes in F5b are transcribed compared to F5m. Using several databases we categorized genes that were transcribed significantly better or worse in F5b compared to F5m using biological function and gene associations. With this information we hoped to identify possible signaling pathways that differ between the two cells. The databases that were used included the Search Tool for the Retrieval of Interacting Genes (STRING) and the Mouse Genome Informatics (MGI) data base. STRING allowed for the identification of gene associations and MGI allowed to determine function. This information will help us develop new hypotheses to explain why F5b is killed by macrophages and why F5m is not.

Colorism as Experienced by Students at Kansas State University and Beyond

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Stemming from colonization, colorism is an embedded form of racism that has been indoctrinated into the minds of not only Black Americans, but communities of color worldwide. Where do we get these ideas, whether said in "jest" or otherwise, that fairer skin is inherently better? The primary goal of this research is to evaluate how colorism affects Black students at Kansas State University in an attempt to understand how colorism affects the Black community as a whole. We also wish to see if these messages of white supremacy and Euro-Centric beauty are to this day being internalized. For this project my research mentor and I had three primary ways of gathering information. First was the reading of peer reviewed journals and articles, second was the content analysis of media, and third was the collection of personal testimonies. We searched the media for the messages that were being sent, looked at the articles for a lens through which to view those messages, and lastly, the personal testimonies to see if Kansas State students were conscious of, or were internalizing these messages. From these testimonies we discovered, correlating to many of the themes found in scholarly articles surrounding the subject, that colorism did seem to have more of a significant effect socially and romantically in the lives of women. Women were more likely to say that their skin tone had an impact on who they surrounded themselves with and their romantic pursuits. More men, however, believed that outsiders saw their skin tone to be related to their aggressiveness. In conclusion, from the narratives of these students and further research, the evidence shows colorism still very much affects the lives and perceptions of Kansas State University students and beyond.

# Establishing biomass growth and lipid and protein productivities for Chlamydomonas reinhardtii

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Petroleum resources have become increasingly scarce over the last century. As the world continues to rely on a nearly depleted source of energy, great concerns over the next source of energy have arisen. Of the new energy sources proposed, biofuel energy has been considered as the top candidate to solve the oil crisis. Recent studies indicate that microalgae can effectively produce lipids in the form of triacylglycerol (TAG). Microalgae can accumulate up to 50% lipids and as a result, their potential within the biofuel industry is immense. However, energy efficient methods are needed for lipid recovery. In addition, recovery of other valuable constituents such as protein can greatly impact process economics. Aqueous enzymatic oil extraction (AEOE), or the use of enzymes to disrupt cell walls and release lipid bodies, is one potential technique for lipid and protein recovery. Having protein and oil productivities established for C. reinhardtii provides crucial information regarding the optimal harvest time. The protein and lipid productivities for C. reinhardtii were established through sample collection and assaying at various stages of the growth cycle. Both Bligh and Dyer procedures for lipid content determination and bicinchoninic acid (BCA) assays for protein content determination were performed on collected The establishment of lipid and protein productivities over time is only the first step in assessing samples. the potential of microalgae as a biofuel feedstock, but serves to guide optimization of growth conditions and extraction procedures that ultimately determine commercial feasibility.

> **News Aggregation Approaches** *Trevin M. Garcia, Dr. Doina Caragea* Department of Computing and Information Sciences College of Engineering

There is a large amount of news data available online. Very often, the same or similar news articles are available from different sources. This makes it difficult for the news consumers to find interesting, non-redundant information. News Aggregators can help with the information overload problem. They can be seen as Web applications that group similar news articles into clusters. The first goal of this project was to study, compare and contrast two methods for News Aggregation. Specifically, we have studied K-Means Clustering (a.k.a., Centroid Clustering) and Hierarchical Clustering, which are two popular clustering algorithms, both suited for performing News Aggregation. We have also studied Web Crawlers, i.e. algorithms that are used for crawling news articles from Web sources. The second goal of the research was to explore the idea that Social Media, specifically Twitter trends, can be used for the aggregation of relevant news articles for a specific geographic location. Towards this goal, we have started the development of an Android phone application that will crawl local news-related tweets from Twitter, use a clustering algorithm to cluster them, and show the user the trends for a particular location. While we may not have the whole functionality ready as part of this project (due to time constraints), the template we are developing will serve as a good start for further development of the Twitter news trends idea, and will thus contribute to the understanding of the capabilities of News Aggregators when used with short texts, such as tweets.

#### Synthesizing Affordable and Efficient Biofuels Brian Neuman<sup>1</sup>, Dr. Hongwang Wang<sup>1</sup>, Dr. Deryl L.Troyer<sup>2</sup>, Dr. Stefan H. Bossmann<sup>1</sup> <sup>1</sup>Department of Chemistry College of Arts and Sciences <sup>2</sup>Department of Anatomy and Physiology College of Veterinary Medicine

The synthesis of biofuels has become a reality, but more effective methods have to be found to produce high quality biofuels at acceptable costs. Currently, biofuels are being produced at high costs because this requires high temperatures and high pressures. An alternative method for producing biofuels could be the hydrogenation of carbon dioxide (CO2), using the earth's abundant hydrogen and CO2 instead of various biofuel crops. Iron/Iron Oxide nanocatalysts are being tested to synthesize aromatic hydrocarbons that form xylenes, benzene, toluene and mesitylene, which make up the high-octane fraction of gasoline used presently. The catalysts are being tested to find one, or a combination thereof, that can increase the yield of the aromatic hydrocarbons necessary for the synthesis of high quality biofuel. To test the catalysts, they were placed into a glass tube that had glass wool placed in both sides, so that only gas can pass through. The tube was then placed into a chamber designed to allow the H2-CO2 mixture to flow through the catalyst tube. When heated to 420oC, the gas mixture gradually changed to the liquid state, which was collected in a vessel on the bottom of the experimental setup. The gathered liquid was then analyzed by means of Nuclear Magnetic Resonance spectroscopy. The NMR was performed to determine which molecules were present after the gas mixture reaction. The conclusion of the experiment will be the discovery of a catalyst that can increase the amount of aromatic hydrocarbons needed in order to synthesize a biofuel.

#### Motivations to Volunteer with Children; Perceptions from Court Appointed Special Advocates (CASA) Volunteers

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Studies suggest that volunteering builds character, empathy for others, and respect for the common good. Studies also document that women volunteer more frequently than men; however, it is unclear why this is the case. No studies to date represent the voice of the volunteer directly in understanding the motivation to volunteer. As children benefit from positive relationships with both men and women, organizations may increase recruitment and retention of male volunteers with a deeper understanding of their motivations. The purpose of this study was to ascertain possible differences between genders in their motivation to volunteer within a children's organization. Drawing from a phenomenological perspective, all volunteers within a local children's agency were invited to participate in one of four focus groups held separately for men and for women. Three men and three women participated. Findings suggest no differences in motivations. Both men and women revealed they volunteer because they have the ability and the time to fulfill a community need and possess a sense of responsibility for the well-being of children. Groups indicated the best part of volunteering was being able to make a difference in the child's life and seeing the case improve. The most challenging aspect was separating from the child when the case was closed. Men and women indicated they would discontinue volunteering if they could not effectively advocate for the child. Although small, this sample suggests the differences in involvement between men and women may be explained by factors other than motivation.

#### Silver Nanoparticles Interaction with Human Cells

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Nanotechnology is science, engineering, and technology conducted at the nanoscale, from about 1 to 100 nanometers. Nanomaterials (NM) have come to the forefront due to their unique physicochemical properties such as high reactivity, large surface to volume ratio, exceptional electronic characteristics, chemical composition (purity, crystallinity, electronic properties, etc.), surface structure (surface reactivity, surface groups, inorganic or organic surface coatings), solubility, shape, aggregation etc. Its wide array of applications in various fields as diverse as agriculture, electronics, and the military is a testament to this exponential growth. NM may be used to deliver drugs in a more effective way, with less side effects than traditional drugs by targeting specific areas of the body allowing for faster recovery and treatment for diseases such as tissue and bone repair and even cancer. Silver nanoparticles (Ag NPs) have found numerous applications in the biomedical field owing to its anti-microbial properties, and are currently used in various consumer products, which have led to considerable human exposure. In this study, we have investigated the role of size, surface chemistry and surface charge of silver NP on the interaction with human umbilical vein endothelial cells (HUVEC). AgNP were characterized for their average hydrodynamic diameter using a dynamic light scattering (DLS) and size using transmission electron microscopy (TEM). Surface charge was measured using zeta potential analysis. Negatively charged lipoic acid coated and positively charged branched polyethylene imine coated (BPEI) 40 nm and 80 nm Ag NPs were exposed to HUVEC cells at various concentrations for 24 h. Our finding shows that NP physicochemical properties play a significant role in the NP-cells interaction and toxicity.

# Exercise, blood flow, and tumor models of prostate cancer: Location, Location, Location

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Tumor oxygenation is highly associated with aggressiveness and resistance to treatments. In pre-clinical prostate cancer models, conflicting results exist on tumor oxygenation between ectopic (subcutaneous) and orthotopic (located within the prostate tissue) models. We hypothesized that blood flow during exercise (versus rest) will decrease in ectopic tumors, whereas flow will increase to orthotopic tumors. In 6 mo old male Copenhagen Rats, Dunning R-3327 MatLyLu tumor cells were injected (104 cells) into the ventral lobe of the prostate (Ortho; n=6) or subcutaneously in the right flank (Ectopic; n=6) and blood flow experiments were performed 21 days later. Blood flow to the tumor and surrounding tissue was measured using radiolabelled microspheres at rest and during moderate-intensity exercise (treadmill; 5 min @ 15 m/min, 10° incline). The blood flow at rest was lower in the Ectopic versus Ortho tumors (13 ± 1 versus 17 ± 2 ml/min/100 g, respectively; P<0.05). Compared to that at rest, blood flow to the Ectopic tumor (both P<0.05 versus rest and between groups). This is the first investigation to demonstrate that tumor perfusion is highly dependent upon host-tissue location and suggests orthotopic models are critical when assessing the effects of any type of physical activity upon tumor characteristics. Given blood flow distribution is governed primarily by the sympathetic nervous system, this data suggests differential arterial vasoactive responsiveness of the tumor host tissue to sympathetic stimuli.

#### Effects of Standardized Ileal Digestible Valine:Lysine Ratio in Low Crude Protein and Low Lysine Diets on Finishing Pig Growth Performance from 70 to 100 lb

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A total of 1,134 gilts (L327 × 1050, PIC, Hendersonville, TN) with an initial body weight (BW) of 68.8 lb were used in an experiment to evaluate the effects of altering the ratio between Standardized Ileal Digestible (SID) valine and lysine in low crude protein and lysine diets. There were 6 experimental treatments arranged in a randomized complete block design with 27 pigs per pen and 7 pens per treatment. Dietary treatments were: SID Val:Lys ratios of 59.0, 62.5, 66.0, 69.5, 73.0, or 75.5% formulated to 0.85% SID Lys and with 13.9% CP. Average daily gain (1.50, 1.58, 1.58, 1.57, 1.64, and 1.60 from 59.0 to 75.5%, respectively), grams of SID Val intake per day, and grams of SID Val per kg of gain increased (linear, P < 0.009) with increasing SID Val:Lys ratio. Average daily feed intake and final BW were marginally increased (linear, P > 0.064) with increasing SID Val:Lys ratio. There was no evidence for differences on feed efficiency and initial BW (P > 0.370). For economics, feed cost per pig increased (linear, P < 0.001) with increasing SID Val:Lys ratios. Feed cost per lb of gain was not different between treatments. Conversely, total revenue per pig increased (linear, P < 0.009) with increasing SID Val:Lys ratio whereas there was no evidence for differences in income over feed cost (P > 0.334). In conclusion, these studies provide evidence to formulate diets for 70 to 100 lb pigs with at least 73.0% SID Val:Lys ratio to achieve optimum average daily gain and feed efficiency.

# Bilingual Training of Feedlots and Dairies to Ensure Food Safety and Animal Well Being

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Commercial feedlot (n=15) and dairy (n=11) employees in Southwest Kansas were selected to test the effectiveness of multimedia training modules. Employees from both operations were asked to complete a demographic survey and a 10 question quiz prior to and immediately after viewing the modules. Employees indicated their job description, age, nationality, language preference, level of highest education, and years of work experience in the survey. Employees included cattle handlers, maintenance personnel and office personnel; age ranged from <21 to >60; years of work experience ranged from <1 to >10; nation of birth included Mexico, USA, and Guatemala. Pre-test scores ranged from 20% to 100%. The modules were provided in either English or Spanish, depending on the language preference of the employee. Post-test scores improved by an average of 15.1% vs. pre-test scores (8.39 vs. 7.29 post-test vs. pre-test, respectively; (P=0.03), and level of improvement was not affected by type of operation (P=0.83), employee age (P=0.30) or years of experience (P=0.14), nationality (P=0.09), or language preference (P=0.22). However, for employees with greater pre-test scores, the improvement in post-test scores after viewing the modules decreased (y = -0.49 \* x + 4.6; r2 = 0.29; P <0.01) indicating that as level of knowledge prior to training increases, there is a diminishing opportunity for improvement. Digital multimedia training modules administered to animal caregivers in feedlots and dairies are effective at improving subject matter knowledge regardless of language preference, nationality, age, job description, or years of experience.

# **Creating 3D Cell Cultures in Decellularized Matrix**

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Currently much of traditional research is done by running experiments on cells in order to minimize pain and distress from animal experiments. Unfortunately, cells in culture often behave differently than cells in the body. A three-dimensional cell culture could replicate in vivo conditions better and many attempts at viable 3D cultures have been tried. The technique explored here allows us to create our own matrix from decellularized tissue.

Healthy lungs were collected from pigs off the KSU CVM necropsy floor and snap frozen in liquid nitrogen. The samples were then taken to the Leica tissue sectioning machine and a section 100 microns thick was cut. A punch the size of the well was then used to cut a circle out from the section. The circle was then transferred to a well in the 48 well plates and a brush was used to push the section to the bottom of the well. The section was either glued to the plate or glued via heat to the bottom of the plate, this was done so the section would not get sucked up when changing media. CHAPS buffer was added to the section to decellularize the tissue. The CHAPS was then rinsed off several times and the 4T1 luc2 (mouse mammary carcinoma) cells were added to the section. Another method we used instead of CHAPS was letting the plate sit under UV light in the hood to kill the cells. A MTT assay was then used to analyze the number of living cells. The result from the MTT assay was then compared to a control on the same plate.

Results demonstrated that cells did not grow well in the tissue matrix. This could have been for several reasons, including tumor cells not surviving in normal matrix conditions. Further research could develop this technique as a useful 3D modeling system.

#### Evolution of multicellularity by co-opting cell-cell adhesion genes

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Multicellular evolution is a major transition that has occurred for more than twenty-five times in many eukaryotic taxa. However, the genetic basis of the transition to multicellularity is unknown in any of these taxa due to high divergence between unicellular and multicellular relatives. The Volvocine algae, however, are a group that have recently transitioned to multicellularity about 200 million years ago that have species ranging from unicelllar (e.g. Chlamydomonas reinhardtii), to colonial groups of like cells (e.g. Gonium pectorale), to those with differentiated tissues (e.g. Volvox carteri). Since these organisms recently evolved in multicellularity and have not diverged significantly, their genomes are surprisingly similar. In an effort to identify genes that may be important for multicellularity, we hypothesize that cell wall genes in unicellular Chlamydomonas were co-opted to promote cell-cell adhesion in colonial organisms such as Gonium. To identify these genes, we created comprehensive phylogenies of cell wall genes in Chlamydomonas, Gonium, and Volvox to identify genes whose evolutionary signature suggested co-option. From this analysis, I identified five candidate genes that may be important for cell-cell adhesion. After functionally testing genes from Gonium using transformation, the resulting phenotype of the mutants reached almost one hundred percent unicellularity. From these results, these genes, more than likely, do not suggest co-option for multicellularity.

#### **Experiences of Low Trauma Disclosure Participants and Their Partners**

Hannah Gray<sup>1</sup>, Briana S. Nelson Goff<sup>2</sup>, Kali Summers<sup>2</sup>, Lori A. Zetmeir<sup>2</sup>, Alyssa M. Campbell<sup>3</sup>, Emma Andres<sup>3</sup>

<sup>1</sup>Department of Social Sciences College of Arts and Sciences <sup>2</sup>School of Family Studies and Human Services College of Human Ecology <sup>3</sup>Department of Psychological Sciences College of Arts and Sciences

Traumatic events affect not only the primary trauma survivor (PTS) but also, secondary trauma survivors who have significant relationships with trauma-exposed and traumatized individuals, (e.g., spouses, children). Intimate partner relationships provide unique conditions for examining and understanding how the interpersonal and/or systemic impact of trauma exposure and post-trauma responses can impact both the primary and secondary trauma survivors, and the interpersonal dynamics of the couple relationship. Preliminary work has indicated that the extent of trauma disclosure may serve as a buffering effect for relationship adjustment for those below the clinical threshold for PTSD (Monk & Nelson Goff, 2014). Researchers have found that relationships can suffer effects in direct correlation to trauma disclosure (Creech et al., 2013; Nelson Goff et al., 2006). The current study explored the qualitative and quantitative data from couples in which one partner was identified as reporting low disclosure about their trauma experiences to their partner. For this study, the low disclosure group (n = 16)included 11 male and 5 female participants plus their spouses/partners. Using the Couple Adaptation to Traumatic Stress Model (Nelson Goff & Smith, 2005; Oseland, Gallus, & Nelson Goff, in press) to provide the framework for understanding the experiences of low trauma disclosure to spouses in a military sample of OIF/OEF service members and spouses, the following variables were used as the qualitative codes: individual functioning of both partners, communication, safety and stability (e.g., role in the relationship, stability adaptability, conflict), traumatic process (e.g., awareness, protective buffering, avoidance), connection (e.g., attachment/cohesion, support/nurturance, intimacy), and resilience (individual, relationship, family). In regards to the model's assumptions for potential positive and negative outcomes, both increased and decreased effects for each variable were included in the data analysis. The systemic effects of low trauma disclosure on both partners and the couple relationship are described.

#### WILDCAT WIND POWER

Armando Marquez, Lawryn Edmonds, Tanzila Ahmed, Timothy Sample, Josh Lloyd, Jacob Meyer, Michael Banowetz, David Plenert, James Remley, Joe Tillman, Peter Jensen, Dr. Ruth Miller Department of Electrical Engineering College of Engineering

Small wind turbines have the potential to make an impact on the energy market, however they need more research and development. This year the Department of Energy is sponsoring the Second Collegiate Wind Competition, through which teams of university students design, build, test and develop marketing materials for small wind turbines. Kansas State University is one of seven universities that are competing in Boulder, Colorado this year. The competition builds on last year's inaugural event; the goal is to construct a lightweight, portable wind turbine that can be used to power small electronic devices. The competition is comprised of a design report, presentation and wind tunnel testing. The design report focuses on the team's ability to conceive, design, and analytically demonstrate buildability of an operable turbine. The team is currently in the process of testing the electrical components of the turbine.

#### Quantitative associations between Tomato spotted wilt virus accumulation, transmission, and expression of heat-shock protein genes in the insect vector, Frankliniella occidentalis, at elevated temperatures

Obdulia Covarrubias Zambrano<sup>1</sup>, Dorith Rotenberg<sup>2</sup> <sup>1</sup>Department of Biochemistry and Molecular Biophysics College of Arts and Sciences <sup>2</sup>Department of Plant Pathology College of Agriculture

Scientists estimate that the increase in temperatures in terrestrial ecosystems will expand the geographical limits of arthropod vector-borne pathogens. We study the virus-vector relationship of Tomato spotted wilt virus (TSWV) and Frankliniella occidentalis. Others demonstrated that TSWV-infected thrips develop faster and transmit the virus more efficiently as adults at elevated temperatures. Heat-shock proteins (HSPs) have been shown to interact with viral proteins to affect replication of plant and animal viruses. We hypothesize that enhanced efficiency of transmission at higher temperatures is explained, in part, by increased accumulation (titer) of TSWV in the vector, which may be associated with expression of HSPs. For this, we designed an experiment to quantify the effect of temperature (19°C, 24°C, and 29°C) on TSWV titer during development and transmission efficiency as adults and to determine the relationship between titer and transcript abundance of HSP. In our study, a 10°C change in temperature accelerated thrips development and increased the percent of adults transmitting the virus. Average titer tended to be higher at 24oC and 29oC compared to 19oC, which mirrored the enhanced transmission efficiencies of ensuing adults. The overall pattern of TSWV accumulation during development was consistent across each test temperature. There were significant positive correlations between virus titer and the magnitude of expression of all three HSPs at the highest temperature. Our findings support the hypothesis that enhanced virus transmission at higher temperatures is associated with enhanced virus accumulation in the vector, and that the amount of virus may be positively associated with HSP expression.

#### **Developing Methods to Market 3D Printers to Women**

*Emmalee Laidacker, Esther Swilley* Department of Marketing College of Business Administration

3D printers are relatively new products capable of creating virtually any 3D object, from toys to shoes to kitchen utensils. With every new product, new methods must be developed to market that product to a desired demographic or audience. Therefore, we are attempting to create methods that will be effective in marketing 3D printers to women. After conducting a focus group consisting of many women of different ages, we have found that women are concerned with the lack of safety features and possible maintenance. On the other hand, many of the women appreciated the fact that 3D printers can produce objects on demand and at one's convenience without having to make a run to the supermarket. They also believe it will prove to be useful around the house and with their children. Also, we inquired what advertisers should avoid when marketing these printers to women. They expressed to us that it would be demeaning if the advertisement stressed that the product was "easy for women" or made it "pink and pretty" in order to "dumb it down" for women. In addition, we found that marketing the product through their children could prove to be effective. To understand, in more depth, women's attitudes toward 3D printers, we surveyed women to understand how different types of advertising appeals affect an individual's attitude and purchase intentions towards 3D printers.

# Internal and External Roles on College Choices for Multicultural Students

Sterling A. Muse, Dr. Dawne Martin Department of Marketing College of Business Administration

College choice decisions are essential issues for institutions of secondary education and upcoming multicultural students. This intended model resembles a continuation of last year's research of 'Social Media's Impact of Decision Making for Multicultural Students'. Self-efficacy (Bandura 1996), locus of control (Chapman and Boersma 1979), parental and family influence (Epstein, 1992; Haveman & Wolfe, 1995) and a variety of other social, personal and college variables have continued to be an enormous resource when collecting and analyzing data. Use of social media in office admissions have continuously updated required expectations of recruiting students (Noel-Levitz, 2012). K-State, for example, has recently examined the effects on using social media and other internal or external factors on multicultural students to influence their decisions to attend college. The research consists of communicating with offices of admissions (via telephone) in Big XII universities to examine the factors of social media and other factors in multicultural enrollment rates. From a local standpoint, K-State students (particularly multicultural freshmen in the College of Business) will be interviewed to examine their influences to various recruiting techniques. These intended questions will mainly display the numerous uses of recruiting techniques, including social media, on the college choice decisions based on difference in location, income, race, ethnicity and first generation status. The result of the information obtained throughout the extended research will develop an overview for office admissions for secondary education to understand how multicultural students are influenced by different recruiting techniques.

#### Synthesizing Dendrimers for the Delivery of Prodrugs To Solid Tumors and Metastases

Yubisela Toledo<sup>1</sup>, Asanka S. Yapa<sup>1</sup>, Hongwang Wang<sup>1</sup>, Deryl L. Troyer<sup>2</sup>, Stefan H. Bossmann<sup>1</sup> <sup>1</sup>Department of Chemistry College of Arts and Sciences <sup>1</sup>Department of Anatomy and Physiology College of Veterinary Medicine

The synthesis of dendrimers as nanovesicles has been developed following elaborative mathematical and chemical procedures. The tree-like structures of these molecular building blocks are defined through the replication of repeated monomers within the structure, which increase the solubility and functionality of these nanoplatforms. The ability to manipulate the shape, size, surface, and morphology of the dendrimers is a vital aspect for the delivery of drugs in a biological system. The chemically engineered dendrimers are "synonymous" to biotic monomers, because they work in conjunction with DNA, RNA, and proteins in order to increase the precision of delivery to target sites. The flexibility of this collaborative approach allows for targeting solid tumors, as well as for including stereochemical properties in the dendrimer-based nanoplatforms. This will work in a code-like manner in that, depending on the void space of the dendrimers, the attachment of biologically meaningful ligands will be performed. We are currently developing and testing multiple generations of dendrimers with varying concentrations of proteolytic enzymes to compare the effects of their concentrations in different environments with respect to targeted delivery and release of dyes as model drugs. Interestingly, starburst dendrimer-based nanoplatforms are being taken up very rapidly by defensive cells, such as monocytes and macrophages, as well as neural and umbilical stem cells. Depending on the nature of the delivery cells, the application of the dendritic nanoplatforms in cancer therapy will permit the targeting and drug delivery of different sites within the biological system.

# Criminals or Victims: Explaining Overrepresentation of American Indians in the U.S Criminal Justice System

Jourdan LeBeau, Dwanna L. Robertson Department of American Ethnic Studies College of Arts and Sciences

Research shows that American Indians are disproportionately overrepresented in the U.S. criminal justice system both as perpetrators and victims. This project provides an overview of the current literature to better understand the impact of colonialism on crime, recidivism and reintegration rates for American Indians. We find both environmental (racism, privilege, poverty) and biological factors (genetic transfer of trauma) serve to perpetuate disproportionate overrepresentation of American Indians. Using an indigenous perspective, we disrupt the current colonized studies that blame dysfunction on the individual rather than social systems of privilege. Through statistics, theoretical explanations, and the latest ground-breaking research, we explain the link between historical trauma and contemporary trauma on Native communities by finding a vicious cycle of trauma that manifests as community dysfunction at the personal, interpersonal, and structural levels.

### NextGen Air Traffic Control

Marco Loma, J. Garth Thompson Department of Mechanical Engineering College of Engineering

It is predicted that in the not too distant future the number of military and commercial UAVs (Unmanned Aerial Vehicles) will increase due to their potential for economic growth. In order for the aircraft to efficiently use and navigate safely through the airspace with no incursions we must develop new methods for air traffic control. A variety of studies such as integrated flight control algorithms and flight path models have been performed to address this problem. The method of this study addresses the issue of air traffic management. The purpose of this research is to create an automated method that can efficiently detect and mitigate incursions between multiple aircraft. Fifth order polynomial segments are used to create 4D flight path models. The model uses a number of waypoints to construct a flight path for the aircraft. The waypoints give the desired position, velocity, acceleration, and time of the aircraft's current state. A program has been developed which uses flight path models to detect and mitigate incursions between multiple aircraft. To mitigate incursions we must take into consideration the "rightof-way rules." A program written in C++ is used to simulate the flight paths and to detect and mitigate incursions. It determines whether mitigation is required to avoid an incursion. If so, it creates a new flight path for the aircraft by adding or moving waypoints. This C++ program will run in a device called a Pixhawk Autopilot. We plan to simulate different scenarios of air traffic management to test the code. After testing the code, we will run the code on a number of different UAVs such as fixed winged and rotary winged. We hope that this method will help to permit UAVs to be used safely in the airspace.

### **Global Sensitivity Analysis of Dam Erosion Models**

Geordy Williams, Mitchell L. Neilsen Department of Computing and Information Sciences College of Engineering

WindowsTM Dam Analysis Modules (WinDAM) is a set of modular software components that can be used to analyze overtopped earthen embankments and internal erosion of embankment dams. These software components are being developed in stages. The initial computational modules address routing of floods through the reservoir with dam overtopping and evaluation of the potential for vegetation or riprap to delay or prevent failure of the embankment. Subsequent modules incorporate dam breach analysis. Current work is underway to include analysis of internal erosion, non-homogeneous, zoned embankments, and the analysis of various other forms of embankment protection. The focus of this project is on the overall software architecture and its integration with Sandia National Laboratories' DAKOTA software suite to perform global sensitivity analysis on a wide range of input parameters.

### Melatonin 1A Receptor's Potential Influence on Seasonal Breeding in Sheep

A. D. Yamashita, A. K. Sexten Department of Animal Sciences and Industry College of Agriculture

Today there is a year-round growing demand for lambs, but this is a problem for sheep breeders, as they are seasonal breeders. Specifically, sheep are short day breeders, which mean they breed in the fall and lamb in the spring. This makes it hard to meet these demands. However, studies have found a link between the melatonin receptor 1A (MTNR1A) and the ability for ewes to breed out of season. This link was found between a few breeds, such as the Merino d'Arles. However, there are breeds that a link was not found, for example, the Ile de France ewes. It was found that ewes with 1 M allele were more likely to breed out of season and have a shorter interval between their first and second lambings. Our research project has been focused on seeing whether or not these findings hold true. DNA was extracted from whole blood collected from 76 White Dorper and 109 Polypay ewes. The DNA will be purified, and polymerase chain reaction (PCR) will run on the DNA to amplify a 824 bp fragment of the MTNR1A gene. The DNA will then be digested with the restriction enzyme MnII in order to determine each ewes genotype for the MTNR1A gene. After the digest, the DNA will be run through gel electrophoresis. The banding pattern generated by the DNA fragments will be analyzed to determine individual ewe genotype. The genotypic results will be compared to the ewes' breeding records in order to see if there is a correlation between MTNR1A genotype and out of season breeding. If there is a correlation, it may help unlock a key to produce more lambs out of season.

# Reniochalistatin E Tri-Peptide Coupling from the Marine Sponge Reniochalina stalagmitis

Dalia Sanchez<sup>1</sup>, Melissa Small<sup>2</sup>, and Dr. Ryan J. Rafferty<sup>1</sup> <sup>1</sup>Department of Chemistry <sup>2</sup>Department of Microbiology College of Arts and Sciences

Marine sponges contain traits to help them survive in the vast oceanic marine life. Amongst the traits is that of cyclic peptides made up of amino acids, which is gaining significance in the pharmaceutical and biomedical areas. The cyclic peptides contain vast amounts of proline amino acid residues. The proline-rich residues were a trait discovered in Reniochalina stalagmitis.

The significance of this research is to use Reniochalina stalagmitis to be evaluated for cytotoxicity; modes of action (MoA) will be accessed to determine therapeutically relevant compounds. The project is directed towards the first total synthesis of reniochalistatin E with the aims of synthesizing a personalized gastric cancer therapy agent. In a convergent fashion reniochalistatin E will be constructed in a rapid and efficient manner for the construction of the target molecule and analogs. The methods of the research are to synthesize the tri-peptide unit composed of Boc-L-isoleucine and methyl L-prolinate-L-leucinate from the individual commercially available amino acids and synthesize analogs that substitute single amino acids for others (L to D and polarity alterations). To be presented will be the current synthetic work of the two tri-peptide units and a presentation of future directions.

The Effects of Green Initiatives on Initial Public Offerings

*Cipriana Sapien, Dr. Ansley Chua* Department of Finance College of Business Administration

Investing in an environmentally friendly or green firm is a hard decision to make. Bauer, Koedijk, and Otten's (2005) study states that there is no investor benefit when investing in a green firm whereas Kempf and Osthoff (2007) state that there is an investor benefit when investing in a green firm. We will discover if investing in a green firm is the right decision by looking at the initial public offerings (IPOs), figuring out the first day return rate, and if it is the right decision when looking at finances. Consistent with Baurer, Koedijk, Otten (2005), we find no significant benefit with investing in green firms.

#### The Relationship between Theory of Mind and Social Reasoning

Monica Diaz-Serrano, Gary L. Brase Department of Psychological Sciences College of Arts and Sciences

Theory of mind is our ability to understand the thoughts, feelings, and intents of others. This ability normally develops in early childhood and previous research indicates that this ability is impaired or delayed in children with Autism Spectrum Disorders (ASD; Baron-Cohen, 1991). This study examines if levels of theory of mind ability in non-ASD adults is related to ability to reason about social situations which entail thinking about others' intentions. This work can provide a baseline for future research on the implications of theory of mind ability for effective social functioning. Theory of Mind abilities have been measured using the Revised Self-Monitoring scale, the Reading the Mind through the Eyes Test, and Happe's short stories. Social reasoning ability has been measured using several variations of the Wason's selection task, which have different types of social and non-social content. Whereas last year the tasks were given to a sample of the general college population, this year we recruited a random sample of students whose scores were more likely to be on the Autism Spectrum and administered the same tasks. We found that in general those from survey 2 (Potential ASD) were less likely to social monitor and the better they did on the Short Stories task, the better they performed on all 3 variations of the Wason selection tasks. In the future we further expect to collect data from subjects diagnosed ASD to determine if their theory of mind ability is either relatively intact but simply delayed or generally impaired, relative to people without an ASD.

# Welcome

# **OURCI Research & Travel Grant Recipients**

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# **Equilibrium Solubility of Gold Nanoparticles**

Bayliff, K. W., Powell, J., Chakrabarti, A., Sorensen, C. Department of Physics College of Arts and Sciences

In this study we measure the solubility of non-ionic gold nanoparticles (GNPs) in saturated solutions. The solutions are composed of monodisperse gold ligated with a shell of dodecanethiol (DDT), with a total diameter on the order of 8 nanometers. The GNPs are solvated in a mixture of toluene and DDT with a specific molar ratio. To characterize the solubility, UV/Visible light spectroscopy is used to determine the absorbance at the plasmon peak once the solution has reached equilibrium at a given temperature. The solubility of the GNPs is strongly dependent on the temperature. A linear fit is created by plotting the natural log of the peak absorbances vs. inverse temperature. The slope of this graph is the enthalpy of dissolution which will be determined once sufficient data is gathered.

**Condition-Dependent in Xiphophorus hellerii** 

Mattie J. Bieberly, Michi Tobler Department of Biology College of Arts and Sciences

It has previously been shown that green swordtail (X. hellerii) females prefer a male with a larger overall size (body plus sword), and that the sword ornament may be a cheap way for males to increase their body size. No studies have been done to examine whether variation in female condition influences their preference. X. hellerii females will be put on a feeding treatment (either high or low food) before conducting mate choice trials to test whether a female's nutritional state affects which mate they choose. The hypothesis proposed is that X. hellerii females see the sword ornament as an energetically cheap way to produce a larger total size, such that for any two males of equal total size, having a larger body to sword ratio may indicate better nutritional history. Thus, if a female is in poor condition (hungry), they should show a preference for a male with a large body and small sword over an equally-sized male with a small body and a large sword. However, females that are in good condition should be less likely to use a male's nutritional state when selecting a mate and would therefore show no preference between two males that are equal size but that vary in their ratio of body to sword length. Females will be placed in tanks for mate choice trials in which they will be shown animations of a male with a large body and a small sword and a small sword and a large sword. The time that females spend associating with each animate male stimulus will be used to measure their preferences.

### Validation of the ASTM F38 Standards as a Certification Basis for Small Unmanned Aircraft Systems (sUAS)

Timothy Bruner, Michael Most Department of Unmanned Aircraft Systems (UAS) College of Aviation Technology

The Kansas State University Standards Validation Project (SVP) seeks to validate the ASTM F38 standards by evaluating a candidate airframe through a mock certification process. The process includes traditional FAA certification procedures, documenting compliance methodology using the ASTM F38 standards in lieu of traditional Federal Air Regulations (FARs) where applicable. In substituting the F38 standards for FARs, and analyzing how the standards address similar problems with respect to airworthiness, it may be determined whether the ASTM F38 standards are suitable for use as a certification basis for sUAS.

The Standards Validation Project is currently ongoing and is expected to continue through 2015. The end result will draw conclusions as to whether the ASTM F38 standards are a suitable certification basis for sUAS based on research findings.

#### Brewing Coffee Party Activism in Tea Party Territory: Faith and Politics in Rural America

Tayler Christian, Alisa Garni, Ph.D., L. Frank Weyher, Ph.D Department of Sociology College of Arts and Sciences

What is the relationship between "Coffee Party" activism and religious faith? "Prairie City," a conservative Republican and Tea Party stronghold, has recently become home to one of the most active local chapters of the national Coffee Party movement. Although the Coffee Party is officially non-partisan, locally it is Left-leaning. While scholars often focus on the association between religion and the political Right, local Coffee Party members participate actively in a variety of religious congregations, and questions of faith and political activism frequently arise at events and gatherings. In our ethnographic research of this organization, we explore how and why a Coffee Party formed in an area of Republican, Tea Party dominance; how religion informs members' activism and political stances; and how participants in the movement navigate religious tensions that emerge from their activism. Further, given that strong but diverse religious commitments inform many local members' views and activities, how does religious diversity affect both the social movement and members' connection to other local social institutions? Such research should deepen our understanding of the relation between religion and politics across the political spectrum as well as of inter-faith social movements on the political Left more particularly.

# Acute Vitamin C Supplementation Effects on Airway Function during Exercise in Exercise Induced Asthmatics

Kara K. Evans, Joshua R. Smith, Craig A. Harms Department of Kinesiology College of Human Ecology

In healthy subjects, bronchodilation occurs during exercise, which also persists for a short time following exercise. With exercise-induced asthma (EIA), the airways narrow during both moderate-intensity exercise and following exercise. Vitamin C supplementation has been shown to reduce the degree of post-exercise bronchoconstriction, but it is not known if this effect occurs during exercise. The purpose of this experiment is to determine if an acute dose of vitamin C supplementation pre-exercise will help reduce the airway constriction in EIA subjects during moderate-intensity exercise. It was hypothesized that an acute vitamin C supplementation pre-exercise will lead to decreased airway constriction during exercise in EIA subjects. EIA subjects were recruited, were asked to refrain from use of inhalers during testing, and performed an incremental cycle test to exhaustion to determine maximal aerobic capacity (VO2max). During the next visit, subjects cycled at 85% VO2max to exhaustion and pulmonary function tests were conducted pre- and post-exercise to confirm the subjects exhibited EIA. The third and fourth visits were double blinded and randomized with the subjects consuming either 1500mg of placebo or vitamin C supplementation. 90 minutes following consumption of either supplementations subjects performed the moderate-intensity exercise bout at 40-60% VO2max. Pre, during, and post-exercise, pulmonary function was measured. Airway inflammation, as assessed via exhaled nitric oxide, was measured pre- and post-exercise. The third and fourth week were separated by a week to allow for a washout period. The prevention of airway constriction in EIA subjects may lead to less breathing discomfort during exercise and improved exercise ventilation, translating into improved enjoyment of exercise promoting a more active lifestyle.

**Post-Occlusive Hyperemia: Effects on Skeletal Muscle Capillary Hemodynamics** *AJ Fees<sup>1,2</sup>, JL Wright<sup>1</sup>, SK Ferguson<sup>1</sup>, CT Holdsworth<sup>1</sup>, TD Colburn<sup>1,2</sup>, TJ Barstow<sup>1,2</sup>, TI Musch<sup>1,2</sup>, DC Poole<sup>1,2</sup>* <sup>1</sup>Department of Anatomy and Physiology College of Veterinary Medicine <sup>2</sup>Department of Kinesiology College of Human Ecology

Post-occlusive reactive hyperemia (PORH) is the commonly accepted non-invasive diagnostic test used for evaluating endothelial function in humans. In contrast to conduit brachial artery blood flow, little is known regarding capillary hemodynamics during PORH. An understanding of microcirculatory behavior post occlusion is fundamental to interpreting the PORH response. Based on previous results found in humans we tested the hypothesis that mechanically induced ischemia of the spinotrapezius muscle would increase the percentage of capillaries supporting red blood cell (RBC) flux during reperfusion. Capillary hemodynamics were measured via intravital microscopy in young male Sprague-Dawley rats at baseline (BL), during mechanical feed artery occlusion (OCC, 1 min and 5 min) and subsequent reperfusion. Mean arterial pressure and heart rate were not altered (both P>0.05). As expected, the percentage of capillaries supporting RBC flux was reduced during 1 min OCC (BL: 90±3, OCC: 2±2%, P<0.05) and 5 min OCC (BL: 87±3, OCC: 0±0%, P<0.05). At 30 s reperfusion the percentage of capillaries supporting RBC flux decreased relative to BL following 1 min OCC (BL: 90±3%, reperfusion: 85±3%, P<0.05) and 5 min OCC (BL: 87±3, reperfusion: 29±3%, P<0.05). Thus during reperfusion the percentage of capillaries supporting RBC flux neither exceeded nor even returned to BL levels up to 5 min post OCC thereby demonstrating impaired capillary function and thus blood-myocyte O2 and substrate flux. Consequently, the PORH state in the spinotrapezius muscle of the rat differs markedly from physiological contraction-induced hyperemia found in humans.

# Membrane Contact Reactors for the Valorization of Lignin Model Compounds

Logan Joos, Michael Wales, Mary Rezac Department of Chemical Engineering College of Engineering

Lignin, a waste product of cellulosic ethanol, has the potential to be hydro-treated into the platform chemicals benzene, toluene, and xylene. By converting a waste product into valuable commodity chemicals, lignin valorization can help cellulosic ethanol biorefineries compete with petroleum refineries by allowing the production of both fuel and chemicals. However, these hydrodeoxygenation (HDO) reactions possess inherent mass transfer limitations due to low hydrogen solubility in liquid and slow diffusion to the catalyst surface resulting in hydrogen depletion at the catalyst surface. To minimize this problem, traditional reactors must use extreme operating conditions, with pressures of 100 atmospheres or more. This work will focus on developing catalytic membrane reactors (CMRs) as an alternative to these traditional reactors, as previous work in our group has shown that HDO reactions can be achieved in CMRs at hydrogen pressures of 3 atmospheres.

The CMRs considered are tubular composite membranes, containing a ceramic substructure with a selective polymer layer on the bore side. Catalyst is attached to the selective layer through a variety of deposition methods. Hydrogen is supplied from the shell side of the membrane fiber and permeated from the shell side to the bore side, where it adsorbed directly onto the metal surface. Liquid reactant was circulated through the bore side, allowing the liquid to come into direct contact with the metal coated surface of the membrane where the HDO occurs. By developing and characterizing one or more CMR system, advancements will continue to be made in membrane design for further hydro-treating of model compounds.

# Inactivation of Bovine Viral Diarrhea Virus (BVDV) during PCR amplifica-tion

Stephanie R. Martin, Maureen Kerrigan, Bob Rowland Department of Diagnostic Medicine and Pathobiology College of Veterinary Medicine

Classical swine fever (CSF) is caused by the infection of CSF virus (CSFV). The CSF virion is composed of single stranded Ribonucleic acid (RNA). PCR is used to detect the presence of CSFV in serum and tissue samples. One important question regarding the detection process is whether or not the PCR process is sufficient to inactivate CSFV in the sample. If CSFV is inactivated, then the sample can be considered safe for further processing. In this project a surrogate, Bovine Viral Diarrhea Virus (BVDV), was used in place of CSFV. BVDV is similar to CSFV in virion composition, structure, and biochemistry. The purpose of this study is to determine if the high temperatures present in a thermocycler can inactivate BVDV to the point where infection is not likely to occur. The first step was the development of a reverse transcriptase (RT) PCR test for the detection of BVDV in a sample. Based on the BVDV sequence, one forward (5'-CCATGCCCTTAGTAGGACTAGC) and two reverse primers, A (5'-CTCGTCCACGTGGCATCT) and B (5'-CTCGTCCACATGGCATCTC) were designed and tested for the amplification of RNA in a sample with BVDV. The results showed that the forward primer in combination with the reverse A primer produced a PCR product of the expected size. Bovine turbinate (BT) cells are being used as the means to detect viable virus in the PCR product samples. Results for these experiments are pending.

### **Epitope Mapping of the ASFV P-54 gene**

Taylor A. Scott, Raymond R.R. Rowland Department of Diagnostic Medicine and Pathobiology College of Veterinary Medicine

African Swine Fever Virus (ASFV) is a double stranded DNA virus in the Asfarviridae family that causes acute and highly contagious hemorrhagic fever in domestic pigs. Currently, genotyping is the only known method of differentiating between strains. There are no serological methods for identifying different strains of ASFV. P-54 is the protein of interest for this study because, as compared to P-72, p-54 provides a higher level of differentiation between viral strains. The E183L gene is a 586 bp gene that codes for the P-54 inner envelope transmembrane protein that is used for virus attachment and absorption into the cell. The goal of this study is to identify non-conserved regions in the gene through epitope mapping. As a starting point we broke this gene into two fragments, one from 0-281 bp and the other from 281-586. The fragments will be amplified using custom primers and PCR. Once the genes have been cloned and ligated into the proper vector and cell line we will express the P-54 protein. These proteins will be used in an ELISA with monoclonal antibodies specific to ASFV isolates to evaluate whether the test is able to differentiate ASVF genotypes using serological methods.

# System Development for Efficient Extraction of Recombinant Human Serum Albumin (rHSA)

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Rice seed-expressed recombinant human serum albumin (rHSA) is a protein with multiple functions, such as transportation of important cellular materials (fatty acids, hormones, and drugs,), buffering pH, and maintaining osmotic pressure. Developing an efficient extraction process would allow for rHSA to be utilized in numerous medical applications. For example: replacing lost fluid and restoring blood volume in trauma victims, modulating inflammatory reactions, vaccines, as well as treatment for cirrhosis, ascites, acute respiratory distress syndrome, etc. Extraction is a critical step to determine protein concentration, purity, impurities that must be removed, and extract process volume. Extraction kinetics data in pH 3.5, 4.0, 4.5, and 6.0 buffer (1:5 rice flour to buffer ratio) was quantified using Bradford assay, gel electrophoresis, ImageJ, and western blot analysis to determine best extraction conditions. Extraction was performed at room temperate and low temperature (2°C-8°C). Studies indicated total soluble protein (TSP) and rHSA concentration increased with pH but not over time. Extraction at pH 3.5 resulted in high purity (78%), however rHSA degraded over time. Extraction at pH 4.0 provided similar purities yet rHSA remained stable. Extraction at pH 4.5 and 6.0 resulted in stable rHSA yields and higher native protein concentrations which decreases purity. Low temperature pH 3.5 extraction retained high purity and stable rHSA yields. Results conclude the most favorable extraction conditions to be at pH 4.0 or at low temperature pH 3.5. Evaluation studies of the effect of extraction conditions on purification is necessary for further development of an efficient integrated process.

# **Potential Implications of Section 333 Exemptions**

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The Section 333 exemption process is currently the way for a company or individual to commercially operate Unmanned Aircraft Systems (UAS) legally. The purpose of this research is to evaluate the current direction of UAS technology; attempt to answer the questions implicit in the evidence, and predict the implications for UAS academic programs. This is an ongoing study consisting primarily of document analysis. Section 333 exemptions are analyzed and data is collected for the purpose of analyzing trends. Predictions were that agriculture would be the main market, but early indications do not support this assertion. The results of this research will give those in the UAS industry critical insight into this developing market.

#### Lagunamide C: Total Synthesis and Cytotoxicity Investigations for Personalized Colon Cancer Therapy

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Colon cancer continues to be one of the most predominant forms of cancer in the United States, with an estimated 137,000 new cases in 2014 and a reported 100,000 deaths in 2013. To this end, more research is desperately needed in the treatment of this cancer. Lagunamide C, a natural depsipeptide natural product, was isolated in 2007 and found to be highly potent against human colon cancer cell line HCT8 with an IC50 of 2.1 nM. Currently, working is underway towards the first total synthesis of this potentially therapeutic compound. The objective of this research project is to synthesize lagunamide C as well as analogs of lagunamide C. Biological evaluation will also be performed. Retro-synthetically, the route is based upon the construction of three units: polyketide, sacrosine, and a pentapeptide unit. Work towards the assembly of the pentapeptide unit will be present, as well as future directions towards the total synthesis of lagunamide C and analogs. The synthesis of this compound and analogs will give great insight into the important structural features of lagunamide C and could provide for the development of more therapeutic drugs.

#### Agriculture production impacts on Cerrado Biodiversity: a land use analysis Sofia Sabates<sup>1,a</sup>; Gabriel Granco<sup>1</sup>; Tyler Link<sup>1</sup>; Marcellus Caldas<sup>1</sup>; Paulo de Marco Júnior<sup>2</sup> <sup>1</sup>Department of Geography College of Arts and Sciences

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The Cerrado is the second largest biome in Brazil, and the most extensive woodland-savanna in South America and occupies approximately 2 million km2. This Brazilian Savanna is a very important ecosystem and has been considered one of the world's biodiversity hotspots. However, anthropogenic interferences are endangering the Cerrado and this factor is so critical that Conservation International (CI) predicts that this biome could disappear by 2030. In the past, the Cerrado's biodiversity was mainly threatened by crop production and cattle ranching for food consumption. Presently, the focus is on the effect of sugarcane expansion for ethanol production on the biodiversity of Cerrado. The main goal of this research is to explore the effects of crop production on biodiversity of the Brazilian Cerrado, focusing on the effects of sugarcane expansion. More specifically, we are interested in verifying if the sugarcane expansion is occurring in areas of high biodiversity value. Our analysis considers land cover data developed by the PROBIO program. The land cover data is used to identify which land use was converted to sugarcane. Sugarcane data was collected from Canasat, a program for sugarcane crop monitoring in Brazil. In addition, data from the sugarcane agro-ecological zoning was used to represent areas suitable for sugarcane expansion. Biodiversity value data was derived from IUCN (International Union for Conservation of Nature) red list of endangered species database. Preliminary results show that crop producing areas are located in low biodiversity value areas. Furthermore, sugarcane has mainly been introduced in areas that were previously used as pasture land or as agriculture. Our preliminary conclusion indicates sugarcane expansion has been concentrated in low biodiversity areas of the state of Goiás.