PURDUE UNIVERSITY

2012

Undergraduate Research Poster Symposium

ABSTRACTS

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Poster # 1/ Physical Science

Title of Poster: Laser spectroscopy of Lignin Monomer Analogs

Presenter(s): Polina Navotnaya, Alexander Parobek, Rachel Clayton

College: Science

Advisor: Timothy Zwier

ABSTRACT:

Lignin is a complex biopolymer found in plant cell walls that is used as a support structure for the plant in order to withstand the environmental conditions in which it lives. This critical polymer is comprised of three major monomers: coniferyl alcohol, sinapyl alcohol, and p-coumaryl alchohol. In an attempt to understand the fundamental spectroscopic and photophysical properties of lignin, we have studied the ultraviolet spectroscopy of three simpler aromatic molecules with a close structural relationship to the lignin monomers. These four molecules are known as guaiacol, 4-methylguaiacol, dimethoxyphenol (DMP) and 4-methyldimethoxyphenol (MDMP) and are near UV absorbing substituents of the lignin biopolymer. These molecules were brought into the gas phase by heating or laser desorption, cooled in a supersonic expansion to very low temperatures (~2 K), and interrogated by various laser-based spectroscopic techniques, including laser-induced fluorescence, resonant two-photon ionization, and dispersed fluorescence. The LIF spectrum of guiacol and 4-methyl guiacol were much as expected, with an intense S0-S1 origin transition, and well-resolved vibronic structure above it. The addition of one more methoxy group to the ring to form DMP and 4-methyl-DMP changes the spectroscopy dramatically, suggesting a large geometry change and the possibility of the presence of other excited state(s) in close proximity. Calculations on the excited states will be used to suggest the reasons for this unusual behavior.

Poster # 2/ Humanities/Social Science

Title of Poster: To Rent or To Own---RESIDENTIAL TENURE CHOICES OF CHINESE STUDENTS IN THE US

Presenter(s): Su Hua

College: Agriculture

Advisor: Dr. Brigitte Waldorf

ABSTRACT:

According to the data from the Institute of International education (IIE), the number of international students at colleges and universities in the United States increased by five percent to 723,277 during the 2010/11 academic year and increased numbers of students from China, particularly at the undergraduate level, largely accounts for this growth, more specifically, Chinese students increased by 23 percent in total and by 43 percent at the undergraduate level.

This research mainly use statistic model (Logit Model) to predict the preference of Chinese college age students' housing choice, in other words, they are more likely to rent a property or own a property. Since Chinese students is the largest international student group (just pass over India to become the largest group) and the increasing rate is relatively high for the past five years, therefore, this large incoming 'residents' will definitely boom the local economy including the grocery market, cars industry and especially the housing market. Regardless of renting or owning, these large amount students will definitely shift college towns' housing price, therefore, local government and university offers should pay sufficient amount of attention on this group. This research will provide decision-maker the predicted tenure choice base on some specific characters like whether the candidate has a car or not; the gender; the degree level; the time lived in the United states etc. Therefore, once we collect these basic personal information, then the model will predict the probability that this candidate is more willing to own a property or rent a property.

Poster # 3/ Humanities/Social Science

Title of Poster: Evaluating Chemistry Video-Game Based Media Learning Environments for Students in General Chemistry Courses

Presenter(s): Andrew Stuffle, Dustin Hillman

College: Science

Advisor: Gabriela Weaver

ABSTRACT:

Reading text and passively watching a professor work out problems has been a common method of instructing chemistry for years, but are there more efficient alternatives for engaging students in chemistry? In the rising age of technology, some questions have arisen as to how new forms of media may be able to effectively present material to a student in a chemistry course. Although the project research is still ongoing, the working hypothesis states that the more involved a student can be in a learning environment, the more the student will be able to learn the material presented to them. To test this hypothesis, we have administered four different chemistry video game-based learning environments (MLE) to students. The learning environments are centered on four different learning styles: reading text, observing screenshots, watching a game play video, and playing a video game. The student will have different levels of interaction based on the MLE to which they were randomized. Observations have been made comparing how effective these environments may be with each other based upon the comprehension a student displays after participating in an MLE.

Poster # 4/ Physical Science

Title of Poster: Modeling Microwave Brightness Temperature of Snow on Sea Ice From in Situ Measurements

Presenter(s): Susan Kurth, Ludovic Brucker, Thorsten Markus, Alexandre Langlois, David Barber

College: Science

Advisor: N/A

ABSTRACT:

The cryosphere on Earth has a significant impact on the Earth's climate; therefore it is extremely important to monitor its evolution. This can be achieved by using space-borne passive microwave derivations (e.g. from the Aqua satellite). The measurements are used as an input for several snow and ice algorithms for monitoring of the cryosphere. In order to better understand which snow and ice properties affect passive microwave measurements, we modeled brightness temperatures from in situ snow measurements. Snow and radiometric measurements were recorded as part of the Canadian Arctic Shelf Exchange Study in the winter 2003-2004 of snow on first-year sea ice in the Arctic, and used here as input into the Microwave Emission Model for Layered Snowpacks. After investigating the sensitivity of the MEMLS model to various snow properties, two parameter adjustments (of the grain size, and of the ice-snow reflectivity) were made in order to best model brightness temperatures in comparison to the measured brightness temperatures. The results of the predictions show that MEMLS is a good model for predicting brightness temperatures of snow on sea ice. Final RMSE values of 19 GHz and 37 GHz range from 2.8 K to 6.8 K in the vertical and horizontal polarization, although brightness temperatures at 85 GHz are not as low. In this study salinity was neglected, and future research will provide a method of including salinity in the model and possibly reduce the error values for the predicted Tb.

Poster # 5/ Life Science

Title of Poster: Identification and characterization of new brassinosteroid mutants in barley

Presenter(s): William Sutherlin

College: Agriculture

Advisor: Burkhard Schulz

ABSTRACT:

Barley is an important crop throughout the world for its use in foods, beverages, and animal feeds. The Green Revolution of the 20th century brought forth an increase in grain yields through the introduction of dwarf and semi-dwarf varieties of wheat and rice. The mutations that led to the development of these phenotypes were characterized as mutants in gibberellic acid biosynthesis or reception, and it has been since shown that brassinosteroids (BRs) have a similar role in cell elongation, which mutations result in dwarfism. There is currently one BR gene that has been characterized in barley, Uzu1. This gene is characterized by a single nucleotide polymorphism (SNP) in the brassinosteroid receptor protein, resulting in a semi-dwarf phenotype.

This project focuses on identifying a BR biosynthesis mutant in barley using the BR biosynthesis inhibitor propiconazole (PCZ). The effects of PCZ treatment are shown to alter plant height, leaf morphology, and overall plant growth. An additional leaf segment-unrolling assay in the presence of exogenous brassinolide will aid in reception or biosynthesis mutant identification. The ample resource of genetic mapping information and expression data on several dwarfing mutants in barley will allow to identify and clone the respective genes from BR mutants.

Poster # 6/ Innovative Technology

Title of Poster: Epiphany Link: Connecting entrepreneurs and skilled professionals together to create innovative business solutions through an online networking site

Presenter(s): Christina Caldwell, Hwee Sann Choo, Derek Hill, Spencer Wolf

College: Technology

Advisor: Terry Burton

ABSTRACT:

Our current generation is said to be that of the entrepreneur. Currently, President Obama is working to create more funds to small businesses and entrepreneurs. He has proposed 3% increase in funds for 2013 for the Small Business Association. He also is a big supporter of the national partnership program, Startup America, which strives to provide important resources and connections to growing companies.

We are working together with our sponsor, Charles Hughey to create StartupTeamBuilder.com. It is a social networking site being developed for entrepreneurs who are in need of local talent, funding, and resources in order to make their idea a reality. Unlike crowd sourcing sites such as CrowdSpring and FundaGeek, and professional networking sites like LinkedIn, StartupTeamBuilder offers an affordable, secure, and confidential networking solution that brings ideas, talent, funding, and local resources together.

Our product will be comparable to the Startup America Partnership; however, it will have an emphasis on local resources rather than regional. Our product, unlike the Startup America Partnership, does not require that you already have a business started, just that you have the idea.

Poster # 7/ Innovative Technology

Title of Poster: Eastern Indian Information Kiosk

Presenter(s): Jennifer M. Maxwell, Laura West, Becca Bogusz, Eric Kaiser

College: Technology

Advisor: Terry Burton

ABSTRACT:

For the indigenous people aged 10-30 in eastern India who are in need of an information base that holds educational products, weather, news, trade, agricultural and job information from local communities. The information kiosk is an energy efficient machine with an easily navigated interface for customers with little knowledge about technology. Unlike other informational kiosks that usually only hold one topic on the machine, ours will encompass more and will give the customers a wider breadth of topics to choose from.

Poster # 8/ Innovative Technology

Title of Poster: Novel Ink

Presenter(s): Duskie Rowland, Nick Hamby, Tracie Borror, Matt Amos, Joe Kapusta

College: Technology

Advisor: Terry Burton

ABSTRACT:

StoryFellows is an online reading website that incorporates an interactive reading interface that engages users. The site contains a unique interface that mimics a real book, in that the text is displayed on two pages and incorporates page turning as an interactive element. The purpose of this research is to determine the most effective way to display a large amount of text that will create an enjoyable user experience and that will enable users to retain the greatest amount of information. A usability test was conducted to determine the best way to display information to users. The study compared three different interfaces, a scrolling interface, single page interface and an interactive interface that featured two pages and mimicked a real book.

Poster # 9/ Humanities/Social Science

Title of Poster: Retention in STEM research and future plans: Comparing effects from CASPiE and traditional curricula

Presenter(s): King Hong Law

College: Science

Advisor: Gabriela Weaver

ABSTRACT:

The Center for Authentic Science Practice in Education (CASPiE) was implemented as a second semester general chemistry course at Purdue University and University of Illinois at Chicago, starting from the spring semesters of 2006 and 2007, respectively. The CASPiE program provides students with hands-on research experience and our purpose is to study this curriculum's influence on students' subsequent involvement in science, technology, engineering, and math (STEM) disciplines. To achieve our goal, all the students who took the course under the CASPiE and traditional curricula were invited to participate in an online survey that prompted students' responses about research participation and their post-graduation plans. In this poster we display the results from the survey analysis, and we assess the influence of the CASPiE program in comparison to the traditional chemistry curriculum.

Poster # 10/ Innovative Technology

Title of Poster: Comparative Analysis Between Fish Tank Virtual Reality and Stereoscopic 3D

Presenter(s): Joshua McCollum, Stephanie Malek, Eric Wright, Matthew Sackley, Kelly Fan

College: Technology

Advisor: Ray Hassan

ABSTRACT:

Stereoscopy is the primary method in which to convey depth perception in film and interactive media, but can present a plethora of problems to individual viewers. The proposal of an alternative solution to depth perception is Fish Tank virtual reality, which is less expensive, easier to implement, and can span a larger audience. Fish Tank virtual reality is a perspective projection coupled to the head position of the observer. This leads to the overarching question: how can fish tank virtual reality reinforce the perception of depth in two-dimensional virtual environments as compared to three-dimensional stereoscopic imagery? Using a qualitative research method, this study aims to validate fish tank virtual reality as a possible alternative to stereoscopic methods.

Poster # 11/ Humanities/Social Science

Title of Poster: Exploration of High School Students Participation in a CASPiE Module

Presenter(s): Rebecca L. Pritchard

College: Science

Advisor: Beatriz Cisneros

ABSTRACT:

The Center for Authentic Science Practice in Education (CASPiE) was created to bring research experiences to undergraduate students as a part of their general chemistry laboratory. One CASPiE module which explored the antioxidant capacity and vitamin C in foods was modified and implemented in two high school chemistry classes in central Indiana. Data collection took place throughout the completion of the module in the form of student interviews and reflection sheets as well as teacher interviews and journals. This research compares how students worked to complete the initial skill building lab phase of the module versus how they worked to complete the independent research lab phase of the module. This comparison was done by examining three types of interactions in the classroom: 1) those that occurred among students in the same lab group; 2) those that occurred between students not in the same lab group; and 3) the interactions between students and classroom facilitators. Analysis of student interviews showed that students in the independent research phase were more independent of students in other lab groups and the facilitators compared to their functioning during the skill building phase.

Poster # 12/ Innovative Technology

Title of Poster: Ovation LLC.

Presenter(s): Brian Fu, Lauren Corley, Nicholas Jacobs, Pearl Kuo

College: Technology

Advisor: Clark Cory

ABSTRACT:

For alumni, staff, future students, and current students, of Computer Graphics Technology who need materials in order to gain interest, support, and financial assets for the university; the Ovation project is a valuable resource that does not currently exist. Our goal is to create material assets that will not only draw interest in alumni and staff giving back more to the university but also increase interest of prospective students. Unlike how the Computer Graphics Technology Department has been currently marketing itself, we will bring it into the next 20 years by creating a new logo for the department as well as distinguishing ourselves through a viral marketing campaign and video/brochure campaign, which increases the avenues for marketing our degree.

Poster # 13/ Life Science

Title of Poster: Characterization and comparison of tissue clearing solutions to improve deep confocal microscopy

Presenter(s): Anna C. Filley

College: Engineering

Advisor: Dr. Kevin Otto

ABSTRACT:

Laser confocal microscopy can be used to analyze the cellular response of brain tissue to injury, including the implantation of a microelectrode device, by capturing images of the fixed tissue surrounding the device at different depths. However, the penetration depth of this microscopy is limited by the scattering of light by the tissue. This can be improved by incubating the tissue in a clearing solution. While various such solutions exist, they have not been previously well compared in their ability to improve tissue transparency for deep confocal microscopy. Additionally, some clearing solutions cause tissue to shrink or swell, which makes analysis of the tissue surrounding a solid device implant difficult. We analyzed four different clearing solutions: A2, U2, sucrose, and BABB, comparing clearing ability and morphological changes. Before and after clearing, brain tissue slices were imaged with a confocal microscope to determine maximum penetration of the laser and analyzed with a spectrophotometer to determine light absorbance. Pictures were taken periodically of the slices using a surgical microscope to quantify size changes. Results of this work will significantly aid in the ability to obtain images at greater depths within tissue slices with minimal distortion of the tissue around an implanted device.

Poster # 14/ Physical Science

Title of Poster: Modeling gyroscopic motion in terms of linear quantities: A study in terms of linear momentum

Presenter(s): Harvey B. Kaplan

College: Science

Advisor: Andy Hirsch

ABSTRACT:

Gyroscopic motion is often described in terms of torque and angular momentum. This method of describing gyroscopic motion proves to be convenient, but covers up the underpinnings as to what gives rise to those concepts: linear force and linear momentum. Using VPython programming, a simplified version of a gyroscope is depicted with four identical masses in place of a traditional massive disk. The program allows for effective analysis of gyroscopic motion in terms of forces and linear momentum, and permits the user to increase the number of masses until the limit of a physical gyroscope is reached. This program is intended to serve as a pedagogical tool for teaching, analyzing, and visualizing complex mechanical systems as it pertains to the gyroscope.

Poster # 15/ Humanities/Social Science

Title of Poster: A Comparative Study on Retention Levels of Elementary Students of Different Ethnicities

Presenter(s): Jonas P. Susaraba

College: Engineering

Advisor: Melissa Dyehouse

ABSTRACT:

Understanding how students of different ethnic backgrounds retain information will help us to improve upon current school curricula to better educate students of diverse demographics. This study compares 2nd, 3rd, and 4th grade students' science and engineering content knowledge retention levels as measured by the Student Knowledge Tests (SKTs) according to ethnic background. The SKTs were administered to students in a diverse school district in the Southwest U.S. at the beginning of the school year (pre) and at the end of the school year following a year-long implementation of engineering curriculum into their classrooms (post). Student participants consisted of 548 students; 192 Caucasians, 96 African Americans, 191 Hispanics, and 69 Asian/Pacific Islander. Results indicate that there is a difference between ethnicities in retention and also how much the students already know prior to testing. Compared to the pretest scores, students showed approximately equal gains in content knowledge on the posttest. Implications include curriculum targeting performance gaps.

Poster # 16/ Physical Science

Title of Poster: Impact Exchange of Material Between Planets of Gliese 581

Presenter(s): Laci S. Brock

College: Science

Advisor: H. Jay Melosh

ABSTRACT:

The discovery of meteorites from Mars and the Moon indicates that in our solar system large impacts can transfer rocky material from one planet to another. It has been suggested that living microbes can be exchanged among the planets by this mechanism. An obvious extension is to ask whether this process could also operate in other solar systems. We chose to focus on the exosolar system Gliese 581, because it contains at least one planet located in the “habitable zon” where liquid water is possible. The system contains four confirmed planets and is much different from our own. We used a computer model, the Ã–pik-Arnold method, to calculate the fate of 10,000 particles ejected from each planet at a range of initial velocities. Our goal is to determine if the “habitable planet” could exchange astrobiological materials with other planets of the Gliese system and evaluate individual exchanges between the other planets in the system. Our results show impact ejecta exchange in the Gliese system is far more isolated, biologically, than the inner planets of our own solar system. The potentially “habitable” planet would have a very small chance of transferring material to the other planets of the system.

Poster # 17/ Mathematics/Computational Science

Title of Poster: Logic patterns of homologous genes across species

Presenter(s): Lillian Liu

College: Science

Advisor: Daisuke Kihara

ABSTRACT:

Researchers spend a large amount of time and many experimental trials in order to discover any relations and patterns between genes in different species. This method is tedious because there are many genes that are currently either not fully understood or have undiscovered fuctions. Through the work of logical computing, we devised a program which takes inputed genes and species of E. coli and converts the genetic information into reduced binary expressions. The logical patterns are simplified expressions to represent all the present genes in order to reveal how the imputed genes relate to oneanother. With these given expressions, we are able to compare our results to the experimental tests. This will allow us to learn more about their importance and functions. This could ultimately lead us to better understand which genes are most important to synthetic organism creation. By disregarding unecessary genes when coding the DNA, this maximizes the efficiency and quality of the created organism.

Poster # 18/ Innovative Technology

Title of Poster: Beyond Code

Presenter(s): Amy N. Hoag, Ethan Wolfe, Cole Went, Zack Meredith, Jow Wilcox

College: Technology

Advisor: Terry Burton

ABSTRACT:

We are using our knowledge of construction and animation graphics to develop an effective resource to teach construction safety for Haskell Construction. Currently Haskell has a power point to teach site safety that has become ineffective. Using an animation to teach site safety will be beneficial because we can include details like dimensions and highlights to accurately show the necessary precautions. Our research will consist of a survey and quiz to measure the effectiveness of learning from the animation. We will be testing Haskell employees as well as students to explore the difference prior knowledge can have on material retention. We expect that our research will show that the animation is a more effective way to teach the material to both groups, those with prior knowledge and those without. The animation will be the first of its kind and our research will explore its potential in industry.

Poster # 19/ Life Science

Title of Poster: Response of x-rays for food density determination

Presenter(s): Xun Zhou

College: Agriculture

Advisor: Martin Okos

ABSTRACT:

Density of foods is an essential physical characteristic used to assess the quality of foods and also a conversion factor for upcoming dietary assessment methods utilizing mobile technology. For porous foods and complex food systems, accurate measurement of density is challenging. Preliminary experiments demonstrated the capability of x-ray imaging as a non-destructive tool to determine food density. The x-ray attenuation through a material is dependent on its chemical composition. The objective of this study is to derive calibration curves for fundamental pure components of foods and thus determine the food density based on their x-ray mass attenuation coefficients.

Poster # 20/ Life Science

Title of Poster:

Cleavage Reaction of Wild Type and Mutant HDV-like Ribozymes at bases G25A-U20C and G25A-U20C,G37A-C22U,C26U Using a Fluorescently-labeled Substrate

Presenter(s): Zulaika B. Miswan, Elaine Chase

College: Agriculture

Advisor: BARBARA GOLDEN

ABSTRACT:

Ribozymes are RNA sequences that use variety of catalytic strategies to cleave itself. Because ribozymes can be found throughout all kingdom of life, understanding of ribozyme cleavage may explains its role in gene expression. HDV (Hepatitis Delta Virus) ribozyme was hypothesized shown to use both acid-base catalysis and metal mediated catalysis between nucleotides U(-1) and G1. In addition, a Mg2+ ion near the HDV-like ribozyme active site was found interacting with a reverse wobble base pair G25-U20 but its role in the cleavage is unknown.To measure the HDV-like ribozyme reaction kinetics, I developed an assay using a fluorescently-labeled substrate to detect ribozyme cleavage. Comparison between wild type and mutant HDV-like at bases G25A-U20C cleavage assays showed no cleavage on the mutant. Suspecting that this mutation caused misfolding of the structure, a new mutant HDV-like at bases G25A-U20C,G37A-C22U and C26U that has the same folding structure with the wild type was made and its assay also showed no cleavage. These results suggested that mutation might have changed the geometry of the bases that are associated with the active site, causing no cleavage on the mutant HDV-like ribozyme.

Poster # 21/ Humanities/Social Science

Title of Poster: Long term effects of CASPiE: A qualitative approach

Presenter(s): Emily V. DiNoto

College: Science

Advisor: Gabriela Weaver

ABSTRACT:

The Center for Authentic Science Practice in Education (CASPiE) was implemented at Purdue University during the spring semesters of 2006 to 2009, in a second semester general chemistry course (CHM 11600). Our study examines the long-term effects that the CASPiE curriculum may have had on students' subsequent experiences in science, technology, engineering, and math (STEM) disciplines. We also studied students who took the traditional chemistry curriculum in the same semester. CASPiE and traditional students were invited to participate in a semi-structured oral interview, at least a year after their course participation. Interviews were analyzed by open-coding and categorizing major themes that emerged. Occurrences of the codes for CASPiE and traditional students were compared to make assertions about the differences and similarities of their experiences. In this poster we show the results from the interview analysis and we discuss the implications for future implementations of curricula similar to CASPiE.

Poster # 22/ Physical Science

Title of Poster: Expression of Resilin-based Proteins and Purification by Selective Precipitation

Presenter(s): Kevin Cherry, Julie Renner, Yeji Kim

College: Engineering

Advisor: Julie C. Liu

ABSTRACT:

Osteoarthritis affects millions of people worldwide. The condition is typically characterized by degradation of articular cartilage of major joints such as the knee and hip causing decreased mobility and pain. Because cartilage has a limited ability to self-heal, researchers have focused efforts on methods that induce cartilage regeneration. Our approach is to use an implantable, protein-based hydrogel with properties analogous to the healthy articular cartilage. The hydrogel provides an environment for cell growth and stimulates new tissue formation. We utilized recombinant DNA technology to create functionalized elastomeric proteins with advantageous properties for therapeutic treatment. The recombinant resilin protein was designed with biologically active domains to influence cell behavior and mechanical domains that mimic natural articular cartilage. This resilin-based protein was expressed in E. coli bacteria. Parameters such as bacterial host, incubation temperature, expression time, and induction method were optimized to increase the protein yield. After salting-out, a solution of the recombinant protein at 95% purity was attained by exploiting its high heat stability. These expression and purification protocols were established by analyzing experimental results on SDS-PAGE gels and by Western blotting. The crosslinked hydrogel scaffolds are now being evaluated for their use in cartilage tissue regeneration.

Poster # 23/ Life Science

Title of Poster: The Microencapsulation of Phages to Prevent the Spread of Salmonella during Pre-harvest

Presenter(s): Alexandria L. Pettigrew, Marissa Myers

College: Agriculture

Advisor: Paul Ebner

ABSTRACT:

During pre-harvest, if an animal is infected with salmonella it can spread and infect the other meat therefore infecting the person who eats the meat. These phages are fed to animals, in pigs the stomach has a pH of 2 and destroys the phage. Chicken drink chlorinated water and the water also destroys the phage. We microencapsulate phages to learn how to enable them to survive in a pH of 2 and chlorinated water, so that the phage can destroy the salmonella. Currently we have microencapsulated the phages without poly â€“ L lysine and the phages have not survived. We do except the phages to survive once they are encapsulated with poly -- L lysine.

Poster # 24/ Humanities/Social Science

Title of Poster: Communicating food safety information through English as a Second Language curricula

Presenter(s): Lisa Schluttenhofer

College: Agriculture

Advisor: Mark Tucker

ABSTRACT:

Hispanics are the fastest-growing ethnic population in the United States; however, due to socioeconomic and cultural factors, Hispanic residents often miss out on government and university information and other resources that could help improve their quality of life. Gaining access to underserved populations can be challenging to public agencies seeking to provide important information about food safety and other topics. Innovative research efforts are required to learn more about this growing population. The current study reports data from 10 in-depth interviews with English as a Second Language instructors to learn more about the manner in which Hispanic residents would like to receive food safety and other important information. ESL instructors based in local communities gain a profound understanding of the needs and struggles of Hispanic populations as they adjust to life in the U.S. Data reported through this study provide practical implications and insights to those wishing to provide food-safety and other science-based information to underserved audiences in Indiana.

Poster # 25/ Innovative Technology

Title of Poster: Development for Construction Graphics Center

Presenter(s): Kathryn L. Gentry, Laura Sutter, Kaylee Oliver, Wesley Young

College: Technology

Advisor: Clark Cory

ABSTRACT:

The purpose of this project is to invite potential sponsors/partners from the construction industry and/or research groups, who are interested in collaborative R&D for the initiation of a BIM Center (Center) at Purdue University, Departments of Computer Graphics Technology (CGT) and Building Construction Management (BCM) in the College of Technology (COT). The intention of the proposed Center is to make a public/private investment in the evolution and implementation of BIM by providing industry, faculty and students the opportunity to participate in current or on-going innovations in and related to BIM. The Center will focus on the most pressing issues related to BIM technology as identified by construction companies through a survey. Center partners intend to produce substantial results through project-based initiatives that result in products, processes and collaborations. The scope of projects would only be limited by the operational, resource and time variables associated with any endeavor of this nature.

Poster # 26/ Innovative Technology

Title of Poster: Active Sensor for Proprioception in Trans-Radial Amputees

Presenter(s): Ian D. Dryg

College: Engineering

Advisor: Pedro Irazoqui

ABSTRACT:

Trans-radial amputations are a major cause of disability, representing over half of upper limb amputations. Currently, no control mechanisms for upper limb prostheses utilize proprioceptive feedback - the perception of the position and orientation of one's limbs. A sensor that will allow proper prosthetic wrist rotation by monitoring the proprioception of the residual limb is proposed. The musculoskeletal system of the forearm remains largely intact following trans-radial amputations, allowing for normal physiological rotation of the residual bones, the ulna and radius. As the patient rotates his forearm with the intention of rotating his phantom wrist, the radius rotates about the ulna. A permanent neodymium magnet will be implanted into the ulna bone, and an array of Hall Effect sensors will be attached to the prosthesis socket, determining the direction of the radial magnetic field component at a given moment. As the direction of the radial component of the magnetic field changes due to rotation of the radius bone, the angle change will be determined and used to rotate the prosthetic wrist the appropriate amount.

Poster # 27/ Innovative Technology

Title of Poster: Solutions in Construction Management Safety Application.

Presenter(s): Jeremiah D. Miller, Manuel Campos, David Foreman, Matthew Huff

College: Technology

Advisor: Terry Burton

ABSTRACT:

In the construction industry, there are many things for a company to take pride in. They may take pride in the quality and speed of their work. They may take pride in their ability to build unique buildings or their efficiency in building similar buildings. Every company has something they specialize and take pride in. But one thing that is a priority in every company is safety. Our group, SICM, is working on mobile app development within the construction industry specifically focusing on safety reporting that appropriately notifies individuals as well as inputting the safety instance into the correct time and position within the Project Review Software or 4D models. We also will be providing daily & weekly reports to a database that is accessible both on and off the construction site. We are working with Pepper Construction to learn about safety hazards as well as current methods in tracking these hazards in an effort to improve safety on the job site.

Poster # 28/ Physical Science

Title of Poster: Chemical Inhibition of Marine Biological Inhibition

Presenter(s): Huang-Chia Chang

College: Science

Advisor: Jonathan Wilker

ABSTRACT:

Marine bio-fouling has been a problem in human marine activity for a long time. The modern methods for antifouling techniques are mostly adding biocide compounds such as tributyltin (TBT) or copper oxide into coating in order to stop the growth of fouling species. However, these harmful anti-fouling systems have been banned by some countries because of the non-selective toxicity and severe environmental impacts. In order to develop new environmental-friendly anti-fouling coating, our research focuses on inhibition of bio-fouling process. Based on the knowledge that bio-fouling is related to radical interactions between glue proteins and fouled surface, the experiments tested the adhesion strength between marine mussel (Mytilus edulis) glue and commercial coatings with chemical inhibitors via Instron test. The test results showed that several compounds had individually lowered the adhesion strength to around 40 kPa. A control compound had the adhesion strength of 77 kPa. The statistical analysis showed that inhibitors had the results of significantly lowered the adhesion strength under 95% confidence level. The results indicated the importance of adhesion inhibition in bio-fouling and provided a solution for the new anti-fouling coatings.

Poster # 29/ Physical Science

Title of Poster: The Non-Linearities of El Nino and La Nina Teleconnections

Presenter(s): Juan A. Crespo, Aaron Goldner

College: Science

Advisor: Matthew Huber

ABSTRACT:

The El Nino Southern Oscillation (ENSO) modulates between El Nino and La Nina, affecting the general atmospheric circulation. Through teleconnections, Earthâ€™s weather patterns are altered as sea surface temperatures (SST) change significantly in the equatorial Pacific. Previous research has proposed that the shifts in SST induced equal and opposite atmospheric responses between El Nino and La Nina that are linear. Though this research concluded that these events were non-linear, they stated that it was slightly inconclusive due to model inaccuracies and limited observational data.

To retest this hypothesis, we created a model run with equal and opposite SST anomalies for permanent El Nino and La Nina cases compared to the control climatological averages. As the independent variable, the SST anomalies altered the atmospheric circulation observed in the model through teleconnections. After plotting global anomalies for certain variables (temperature, pressure, precipitation, etc.), we added the El Nino and La Nina anomalies to observe any equal and opposite anomalies between the two test cases, which would show any linearity. Our experiment observed that El Nino anomalies were much stronger than opposite La Nina anomalies, concluding that the teleconnections are non-linear with equal and opposite SST anomalies.

Poster # 30/ Innovative Technology

Title of Poster: GPU Raytracer

Presenter(s): Joe Ferfecki, Grant Windes, Kayla Steckel, Andrew Kennedy

College: Technology

Advisor: Terry Burton

ABSTRACT:

The goal of RTR Interactiv is to explore the viability of an interactive GPU ray tracer in a production environment. This is addressed by building a GPU ray tracer and testing the render time per frame of increasingly complex 3D scenes.

The ray tracer is developed using Nvidia's OptiX ray tracing engine which provides a powerful and flexible framework for producing ray tracing applications. A simple ray tracing engine is first built that accommodates common materials and ray tracing operations; specifically reflection, refraction, and shadowing. After a basic ray tracing engine has been implemented, more complex features can be added.

RTR is testing the interactive GPU ray tracer on several different 3D scenes. Each scene is comprised of a Cornell Box with one or more copies of the Stanford Bunny. A simple lambertian shader is used on the surface of the Cornell Box and the Stanford Bunny may be either a lambertian, reflective, or refractive material. The collection of scenes will be tested on multiple GPUs. At the end of the testing, RTR Interactiv will present the results of the testing in a table that compares the performance of the ray tracer on each GPU.

Poster # 31/ Life Science

Title of Poster: NOVEL APPROACH TO COMBAT MULTIDRUG RESISTANT BACTERIAL PATHOGENS

Presenter(s): Muhammad A. Soofi

College: Science

Advisor: Mohamed N. Seleem

ABSTRACT:

By the time you have finished reading this abstract, eight individuals will have become infected by Salmonella in the United States alone. By the end of the day, two Salmonellosis patients will have died and Salmonellosis infections will have cost the American healthcare system over $8 million. The rising incidence of multidrug resistant strains alongside of the palpable impact of Salmonella on domestic and international healthcare systems provides a great impetus to develop novel antibacterial agents that can combat Salmonella. Peptide Nucleic Acids (PNA) are oligonucleotide analogs that can be engineered as antisense agents capable of silencing specific essential genes required for bacterial viability. This study determined the efficacy of two PNA constructs designed to target the critical Î±-subunit and the sigma factor of Salmonella RNA polymerase. In vitro analysis revealed that both constructs led to significant reduction of Salmonella at 5 ÂµM and complete elimination of Salmonella at 15 ÂµM. During in vivo testing, neither constructs showed significant clearance in intracellular Salmonella when incubated with a PNA concentration of 30 ÂµM for 4.5 hours. However, at a PNA concentration of 15 ÂµM, the anti-Î±-subunit construct was able to completely eliminate intracellular Salmonella after a longer 24 hour incubation. The ability of PNA constructs to effectively eliminate Salmonella in both extracellular and intracellular infection models highlights its potential as an antibacterial agent. The novelty and effectiveness of antisense PNAs suggests that PNA constructs may play a role in addressing the need for innovative therapeutics to combat antibiotic resistant strains.

Poster # 32/ Innovative Technology

Title of Poster: Evaluating the Effect of Using 3D Task Cards on a Mobile Platform in Aviation Maintenance

Presenter(s): Patrick McGuire, Nate Christopher, John Pourcho, Shawn Ruemler

College: Technology

Advisor: Dr. Nathan Hartman

ABSTRACT:

Current aviation maintenance work instructions do not display information effectively enough to prevent costly errors. These errors also create safety concerns. A possible solution to this problem would be the use of 3D product definition task cards used on a mobile platform. Previous studies have shown that the use of 3D graphics work instructions allow the user to more efficiently and accurately interpret maintenance information. For aircraft maintenance workers, the use of mobile 3D model-based definition task cards could be beneficial to the maintenance process because they have the ability to deliver relevant and timely information. Unlike previous versions of 3D model-based definition task cards and 2D paper task cards, which are currently used in the maintenance industry, these 3D model-based definition task cards will be more mobile and accessible. Using QR codes and mobile applications combined with 3D product definition on mobile devices could increase the efficiency, accuracy, and mental workload for technicians when performing maintenance tasks.

Poster # 33/ Physical Science

Title of Poster: Aerobic biotransformation of 17alphaâ€“estradiol and 17beta-estradiol in soil.

Presenter(s): Dara Green, Micheal Mashtare

College: Agriculture

Advisor: Linda S. Lee

ABSTRACT:

While the effects of 17beta-estradiol on animals and organisms in the environment have been studied quite frequently over the past few decades, less is known about its stereoisomer, 17alphaâ€“estradiol. Focus has centered on the beta isomer because it was shown to be 100 to 500 times more estrogenic than the alpha isomer based on mammalian studies. Newer studies, however, suggest the impact of 17alphaâ€“estradiol and 17beta-estradiol on aquatic species is much narrower, with only a 7 to 30-fold difference in potency between the isomers. Given the alpha isomer is the main form excreted in manure by dairy and beef cattle, which is then land-applied for nutrient content and disposal, isomer-specific information regarding fate-transport of these estrogens in the environment is important. Degradation is one mechanism affecting the behavior of both isomers and has been assumed to be the same for both isomers even though there have not been sufficient studies conducted to validate that assumption. To compare the degradation rates of the 17Î±-estradiol and 17Î²-estradiol isomers, a coloma soil and a drummer soil were selected based on assumed differences in soil properties, such as clay content, pH, and CEC. The soils were amended with both stereoisomers using talc as the carrier, and sacrificed at times 0, 2, 4, 8, 12, 24, 48, 72, and 445 hours to determine the half-lives and degradation rates of each isomer. Using a first order exponential decay model, half-lives for both isomers were determined to be ~5 hours and ~11 hours in the drummer and coloma soils, respectively. While the degradation rates between the two soils were significantly different, the degradation of the two isomers when compared to each other were not statistically different. This finding validates the assumption that the alpha and beta isomers degrade similarly. However, taking into account the differences in soils and soil properties is important in determining how the isomers will behave in the environment.

Poster # 34/ Physical Science

Title of Poster: Photo Documentation Techniques of Laser Aided Shooting Reconstruction and Bullet Trajectory

Presenter(s): Daniel D. Long

College: Liberal Arts

Advisor: Jan Cortner

ABSTRACT:

Clear and concise photography is crucial for effective shooting scene reconstruction. It assists a jury in visualizing the events that took place, and it aids investigators as they piece together crucial elements of the crime. Capturing laser illuminated trajectories of fired bullets is one of the most difficult and costly photography techniques used in reconstructing a shooting scene. By experimenting with numerous different camera settings and laser enhancement techniques, I was able to document the most effective method to capture the trajectories of fired bullets. Commercially available aerosol products, designed specifically for shooting reconstruction photography, can be used to make the laser's beam visible to the naked eye, but is was found that the use of inexpensive hairspray also accomplished the task with much less cost. Another method demonstrated was the use of a white piece of cardboard to allow the laser's beam to become visible to the camera's lens. This method was the least expensive and had the most preferable results in terms of brightness of the laser on film. Finally, trials were conducted capturing multiple trajectories during one exposure. This method is used to show the paths of multiple bullets fired in one picture. This project showed that effective photography of laser beams does not have to be off limits to investigators due to difficulty, cost or lack of training.

Poster # 35/ Humanities/Social Science

Title of Poster: Consumer Cooking Fuels in Cameroon

Presenter(s): Hannah Joy Pheasant

College: Engineering

Advisor: John Lumkes

ABSTRACT:

Many countries lack a sustainable supply of wood for fuel. Women spend hours gathering wood in unsafe conditions rather than risk the lives of their families through unsanitary water. Trees that survive the climatic conditions are prematurely cut for firewood. This project designed a low cost, easily producible biomass briquette hand-press to help reduce a dependence on wood as fuel and to utilize biomass material normally left to decompose. The hand-press's design utilizes materials readily and affordably available in Africa so that the hand-presses can be built in-country to reduce cost and promote sustainability by local ownership. Different ratios of banana peels and sawdust were used to validate the hand-press as they were deemed representative biomass by partner NGOs in Western Africa. Tests were developed to determine the sturdiness of the briquettes and their ability to withstand disintegration when wet amid variation of biomass ratios and preparation methods. Field testing was conducted in western Cameroon with comparisons to the partner NGOs current Legacy press. The designed hand-press produced denser briquettes than the Legacy press but took significantly longer. Market research was conducted via structured interviews in rural and urban areas of western Cameroon on current cooking fuel usage and potential future interest in biomass briquettes. Most rural respondents were not interested in using a fuel source that they would have to make a cash expenditure for they are used to collecting firewood at no cost. A majority of urban respondents were very interested in the idea of being able to produce their own fuel source as they currently buy their cooking fuel however, the price range they were willing to pay (5-10 USD) is significantly lower than the cost for the proposed hand-press (30 USD). A business analysis shows that at this time there is not a hand-press design which can be produced within the price range respondents are willing to pay. This, in addition to the difficulties producing sufficient pressure with a hand-press, confirms that moving forward with developing a biomass briquette hand-press is not feasible.

Poster # 36/ Innovative Technology

Title of Poster: Web and crowd funding methods in physical therapy video game development

Presenter(s): Juan Carlos Orendain, Joshua Balcitis, Dalonte Keemer, Matthew Wilson

College: Technology

Advisor: David Whittinghill

ABSTRACT:

Video Game development is an expensive endeavor. In the Fall semester of 2011 in the class of CGT 411, Burnt Wing Studios created a tech demo for "Project Burnie". Project Burnie is a Kinect based physical therapy game for kids suffering from Cerebral Palsy. Roasted Rooster has created the online presence for investors and the architecture for social interaction between the patients. The website was developed in two versions, one in HTML 5 current and future web browsers and a backwards compatible version built in PHP. The website also includes a link to a Kickstarter event, other investment opportunities and a general contact form. The website fulfills the social needs of the patients by displaying an online leaderboard, achievement system and online avatars. Roasted Rooster Studios researched possible funding options and decided to reach out to the charity Child's Play, to create a Kickstarter event and offer serious investment opportunities through the project's website.

Poster # 37/ Innovative Technology

Title of Poster: Calcium Carbonate Nanoparticles for Carbon Dioxide Sequestration

Presenter(s): Ross Catron, Antonio Coelles Vargas, Alex Freer

College: Engineering

Advisor: Michael Harris

ABSTRACT:

One method for removing carbon dioxide from an exhaust gas stream is to scrub the carbon dioxide from the stream by contacting it with an aqueous solution of calcium hydroxide in order to produce solid calcium carbonate. A surfactant can be added to this solution to produce nanoscale particles of calcium carbonate. Nanometric calcium carbonate can be used in pharmaceuticals and other various applications in the medical industry. We used a gas stream of carbon dioxide and air, similar to what is found in a flue exhaust gas, with varying concentrations of carbon dioxide (30% or less). The carbon dioxide is converted into calcium carbonate by reacting it in a basic solution. Addition of a surfactant was necessary to obtain nanoscale particles. Different surfactants were tested to further optimize this process. Optimization of the process was found by varying agitation rate, flowrate, and calcium hydroxide concentration. The fundamental chemical, kinetics, thermodynamic, and transport principles that govern each process were studied. The conditions that produced the smallest calcium carbonate particles in the largest quantities were found. This method of carbon sequestration is able to produce nanometric calcium carbonate particles that could be useful in the medical industry.

Poster # 38/ Humanities/Social Science

Title of Poster: Living and Saving Green: An Economic Assessment of Purdueâ€™s Food Waste Handling System

Presenter(s): Amy Winter

College: Agriculture

Advisor: Dr. John Lee

ABSTRACT:

"Going Green" has become a catch phrase of the decade that has become the focus of individuals and corporations. Purdue University prides itself in striving to implement "green" practices on their West Lafayette, Indiana campus. Purdue University Dining Services provides 3.5 million meals a year on average in a five location buffet-style system. Post-consumer food waste is created by this system weighs over 1,000 tons per year. The current disposal system is with the anaerobic digester at the West Lafayette Waste Water Treatment Plant. Along with the current option, the options of compost, landfill disposal with pulper and landfill disposal without pulper were analyzed on yearly cost then compared to determine "worth" of environmentally friendly disposal. The option of Purdue purchasing an anaerobic digester for electricity generation from food waste was determined unfeasible due to food waste volume. The current method of anaerobic digestion for electricity generation was the cheapest. Results also determined that the pulper is an essential part of the disposal process, by reducing the cost of landfill disposal by $33,000 a year.

Poster # 40/ Physical Science

Title of Poster: Upscaling Effects of Supercell Thunderstorms: Joplin and Tuscaloosa Case Studies

Presenter(s): Joseph Woznicki

College: Science

Advisor: Dr. Jeff Trapp

ABSTRACT:

An analysis of the Spring 2011 tornado outbreaks in Missouri and Alabama provides evidence for significant upscaling in the wake of strong supercell thunderstorms â€“ with the most significant effects associated with the strongest of storms. Upscaling, or upscale feedback, refers to the alteration of certain atmospheric fields on a larger scale than the supercell itself. Radar and satellite imagery for each event provides information about supercell location and strength. Numerical Weather Prediction (NWP) model analyses allow assessment of changes of atmospheric variables, as summarized through parameters like convective available potential energy (CAPE), storm-relative environmental helicity (SREH), and potential vorticity. It is crucial to understand supercell upscaling because of possible implications on prediction. Analyses of these parameters were performed using data from the National Climatic Data Center with Integrated Data Viewer (IDV) software. The case studies found that each of the two supercell thunderstorms were associated with a decrease in CAPE, increase in potential vorticity, and minimal change in SREH in their wakes. These trends can help us gain a better understanding of the atmospheric dynamics in the wake of supercell thunderstorms. Ongoing analyses will perhaps shed new light on other affected parameters.

Poster # 42/ Life Science

Title of Poster: Development and Recovery of Latent Prints from Inside of Latex Gloves

Presenter(s): Kristin Blunt, Austin Crawford

College: Science

Advisor: Patrick Jones

ABSTRACT:

Often a perpetrator, knowledgeable in forensic methods, uses latex gloves to prevent leaving his fingerprints at a crime scene. Many times these gloves are discarded at the scene or thrown into a nearby trash receptacle. Various methods have been used in the past such as cyanoacrylate fuming, various fingerprint powders, fluorescent powders, rough lift, and many others with minimal results. During the course of this research project, these methods as well as others were attempted. Fluorescent powders were also used in conjunction with a UV light source. Magnetic powders were also used in the experiment. The darker powders gave the best results, however they were not consistent. All of the powders were applied with fingerprint brushes. It was decided to experiment with different delivery methods for the powder.

Best and consistent results were obtained by placing black ruby powder in a Ziploc bag with the glove of interest and shaken to evenly and lightly coat the glove with the powder. Fingerprints from every finger were visible and clear. This method, the Shake N Bake method, proved to be the most efficient and effective way to develop latent fingerprints from the interior of latex gloves.

Poster # 43/ Life Science

Title of Poster: Kinetic and Enzymatic Analysis of Y130F Mutation on Phenylalanine Hydroxylase from Chromobacterium Violaceum (cPAH)

Presenter(s): Ellina Libman, Kyle Wagner

College: Science

Advisor: Dr. Mahdi Abu-Omar

Dr. Chittaranjan Das

ABSTRACT:

Deficiency of the enzyme phenylalanine hydroxylase (PAH) is responsible for diseases such as Phenylketonuria which can lead to many complications in infancy. The active site chemistry of PAH from Chromobacterium violaceum (cPAH) was investigated by analysis of the mutations Y130F and Y130A. Tyrosine 130 in the active site is part of a flexible loop which allows it to move 14A toward the protein surface when bound to iron and the cofactor pterin. This positioning may create a channel for Phenylalanine or dioxygen to enter the active site. Y130F, a mutant in which Tyrosine 130 is converted to Phenylalanine, has been shown to position the residue in the same location as the iron- and cofactor-bound enzyme. It is also thought to hydroxylate the phenylalanine back to tyrosine. Tyrosine 130 was mutated to both phenylananine and alanine, and then purified by GST affinity chromatography. Successful crystallization of the Y130F and Y130A mutated proteins will now allow for kinetic and saturation analysis. Circular Dichroism (CD) and structural analysis are soon to be performed.

Poster # 44/ Life Science

Title of Poster: Superoxide Production by Cytochrome bc Complexes

Presenter(s): Jason T. Stofleth, Danas Baniulis

College: Science

Advisor: Dr. William Cramer

ABSTRACT:

Superoxides, often referred to as free radicals, are implicated in the aging process, involved in cell signaling, and are potent precursors to cell death as a response to cellular dysfunction and distress. Electron transport proteins of photosynthesis and respiration are significant sources of superoxide under such conditions. The cytochrome b6f complex of oxygenic photosynthesis is homologous to the cytochrome bc1 complex of respiration, but there exists a fundamental difference in the oxygen concentration in the surrounding membranes. The goal of this research is to determine if there is a different rate of superoxide formation between the two cytochrome complexes due to oxygen availability. To measure the rate of superoxide formation, each protein is isolated and assayed with a hydrogen peroxide reactive fluorescent dye. This will allow the rates to be compared for the two cytochrome complexes. Preliminary data shows that the rate of superoxide formation for cytochrome b6f is 10-fold greater than that of cytochrome bc1, and is 15-fold greater in the presence of inhibitors. This suggests that there is a significant difference in superoxide formation between the two complexes.

Poster # 45/ Life Science

Title of Poster: INHIBITION OF SWINE INFLUENZA VIRUS BY TAMIFLUÂ®-EC20-VERRUCARIN A

Presenter(s): Elaine McCarthy, Youngsoon Kim

College: Agriculture

Advisor: Dr. Roman Pogranichniy

ABSTRACT:

Influenza is caused by a virulent virus and is a major cause of acute respiratory disease in finishing pigs. H1N1 swine influenza virus (SIV) is endemic among pig populations in the U.S. and is common throughout pig populations worldwide with about 25% of all pigs showing evidence of having been exposed to the virus. TamifluÂ® is an oseltamivir drug used to prevent and treat infections of the influenza virus by preventing the release, replication, and spread of the virus in humans. Verrucarin A is a macrocyclic trichothecene that can halt viral protein synthesis. A pharmaceutical drug was synthesized combining both TamifluÂ® and Verrucarin A called TamifluÂ®-EC20-Verrucarin A. In this study plaque assay was used to determine if TamifluÂ®-EC20-Verrucarin A is an effective inhibitor of SIV H1N1. The results indicated that TamifluÂ®-EC20-Verrucarin A has potential to inhibit SIV H1N1, but more research needs to be done for more conclusive results. If the research is successful, it can lead to a more potent and cost effective treatment of swine infected with influenza virus.

Poster # 46/ Life Science

Title of Poster: Improving Food Safety with Bacteriophage Therapy

Presenter(s): Melanie R. Papariella, Jiayi Zhang

College: Agriculture

Advisor: Dr. Olayiwola Adeola

ABSTRACT:

Annually, the Centers for Disease Control and Prevention report over 40,000 culture-confirmed cases of salmonellosis. A significant number of these illnesses are associated with contaminated pork products. Previously, our laboratory demonstrated that bacteriophage-base technologies significantly reduced Salmonella colonization in pigs. Here we characterized the phages in our libraries in terms of growth kinetics, killing efficiency and genetics to better identify viruses that are appropriate for use in live animals. In single-step growth kinetics assays, phages DR, CHI, and WI had the highest killing efficiencies in terms of growth rates (9.638, 2.61, and 10.787 phage/cell/minute, respectively), latent periods (74, 64, and 46.8 min, resp.) and burst sizes (4.847, 1.539, and 4.902 min, resp.). In survivability assays, however, the same phages were considerably affected by acidic environments (>99.0% reduction in viable particles at pH 2.0 after 5 minutes). Additionally, each phage was significantly susceptible to chlorinated water (tested in sodium hypochlorite 0.042%). In contrast, the phages were unaffected by low concentrations of trypsin and chymotrypsin. Taken together, these results indicate that certain phages have higher killing efficiencies, but will require protection (e.g., microencapsulation) for processing and administration to live animals. Ultimately, these results will enable us increase food safety through bacteriophage therapy.

Poster # 47/ Life Science

Title of Poster: Characterization of VGluT2â€“Positive Axon Terminals in the Rat Medial Geniculate Body

Presenter(s): Sarah E Kober

College: Science

Advisor: Professor Stephanie Gardner, Dr. Edward Bartlett

ABSTRACT:

Sound stimuli pass through many brain regions on their way to the auditory cortex, where the perception and interpretation of the stimuli occur. One nucleus in the ascending auditory pathway is the medial geniculate body (MGB). A major input for the MGB comes from the inferior colliculus (IC) of the brain in both inhibitory and excitatory messages. A subset of the excitatory inputs from the IC contain Vesicular Glutamate Transporter 2 (VGlut2), however this input has not been well-characterized.

The objective of this study was to quantify the distribution and attributes of VGlut2- positive axon terminals. Thin sections rat brain were labeled for VGlut2 and multiple 40x images were used for analysis in the dorsal, ventral and lateral regions of the MGB.

We have found that the average axon terminal area in the three subdivisions were not that different, but that the range of sizes were. The average axon terminal area (+/- SEM) was 58.2+/ 2.17 Âµm2, 54.50 +/- 2 Âµm2 and 55.96 +/- 6.2 Âµm2 for dorsal, ventral and lateral regions, respectively. We will expand this data set to multiple animals to get a more complete characterization of the VGluT2-positive axon terminals in the rat MGB.

Poster # 48/ Innovative Technology

Title of Poster: Label-free Imaging of Fat Distribution inside Living Worms

Presenter(s): Anna M. Sullivan

College: Engineering

Advisor: Ji-Xin Cheng

ABSTRACT:

With obesity and obesity related difficulties becoming more prevalent around the world, the need arises to understand the genes that aid in the location and quantity of lipid stores within living organisms. A microscopic transparent worm that is genetically similar to humans, Caenorhabditis elegans (C. elegans), was utilized to examine the dependence of lipid storage on certain genes. The quantity of alterations in the lipid droplets of the diverse mutant C. elegans can provide a means to identify the different roles the genes play in lipid storage. To identify the lipid stores, lipid droplets, in living worms was conducted with Stimulate Raman Scattering (SRS) imaging, which detects the intrinsic vibrational mode of a molecule containing C-H and demonstrates a label-free method for mapping lipid droplets. Analysis of the small particles detected within the worms involved a written program in Java code and reduced the time required for manual analysis. Information involving the amount of lipid droplets within each mutant type worm provides quantitative view for certain genesâ€™ role in lipid storage which ultimately provides a better understanding of genes involvement in lipid metabolism of living organisms.

Poster # 49/ Humanities/Social Science

Title of Poster: K-12 Student Attitudes Towards Engineering

Presenter(s): Aaron Lemcherfi, Brett Kult

College: Engineering

Advisor: Dr. Johannes Strobel

ABSTRACT:

Less than 6% of the 1.1 million students who took the ACT exam declared engineering as their career goal in 2002, as compared to 9% in 1992(American College Test Company). In response to this decline, results of this pilot study will be used to determine the magnitude of change in student attitudes towards engineering before and following a year-long engineering intervention. A study published by the British Department of Psychology indicated that the size of objects in student drawings are representative of student attitudes toward those objects; with larger images being associated with positive attitudes and smaller images with negative attitudes (Burkitt, Barrett, & Davis, 2003). Data were obtained by prompting second through fifth grade students from 12 classrooms at an independent Midwest school, to draw four images: a teacher, a doctor, an engineer, and a scientist. After participating in a year-long engineering intervention where students learned about engineering principles, design, and modeling, students were prompted to again draw the same four images. Comparing student drawings pre/post will provide evidence about changes in student attitudes. Results will be used for programmatic evaluation and curricular revision.

Poster # 50/ Life Science

Title of Poster: An evaluation of a rat model of Parkinson's disease: Examining the effects on vocalizations.

Presenter(s): Bridget K. Haley, Jessica Huber

College: Agriculture

Advisor: Mark A. Diekman

ABSTRACT:

Patients with Parkinson's disease experience significant changes to speech and voice production including reduced vocal intensity, pitch variation, and articulation which all result in reduced communicative effectiveness. This project examines the effects of bilateral injection of 6-OHDA in the striatum on rat vocalizations. Since the cranial nerves receive input from both sides of the cortex, a bilateral injection is likely a better model of speech related changes in Parkinson's disease, since patients with Parkinson's are impaired bilaterally. Previous experiments using rat models have used unilateral injections of 6-OHDA. Further, while many other groups have looked at rat vocalizations, few are using a tickling technique for elicitation, even though it can control the distance to the microphone. To measure vocalizations, rats were recorded while being tickled both before and after lesioning. Changes to the number and type of vocalizations, intensity of vocalization, and pitch variability of vocalizations across the two recording periods are the primary measures. We have used a range of doses to assess at what level the neurotoxin begins to have an effect. Across this range of doses and in both sexes we have not yet seen trends possibly because the lesions were incorrectly placed.

Poster # 51/ Physical Science

Title of Poster: Degradation Effects of Plasma in High-Power Radio-Frequency Resonators

Presenter(s): Joseph S. Katz

College: Engineering

Advisor: Dr. Dimitrios Peroulis

ABSTRACT:

As wireless technology becomes increasingly ubiquitous, power levels in radio-frequency (RF) filters are pushed to their limits, which can result in plasma formation when air is used as a dielectric. Although work has been done to model and test the short-term effects of plasma formation on the RF performance, no work has characterized the reliability issues due to sustained plasma exposure. In order to test the long-term effects of this breakdown, a copper resonator with an air gap of approximately 8Î¼m was subjected to a 10W signal at its resonant frequency of 2.2GHz. Confocal microscopy was used to measure surface roughness of the resonator's capacitive region, and a precision network analyzer (PNA) was used to measure the s-parameters. Measurements were done before exposure, and after nine days of exposure, with power transmission measurements taken twice per day during exposure. A resonant frequency decrease of 20 MHz is seen based on the PNA results, although confocal microscopy images show minimal surface degradation. These preliminary results indicate the need for further long-term testing, and measurements using more power, which are currently in progress.

Poster # 52/ Life Science

Title of Poster: Assessing the Autonomic Nervous System in the 6-OHDA Rat Model of Parkinson's Disease

Presenter(s): Ryan D. Slabaugh

College: Science

Advisor: Dr. Kevin Otto

ABSTRACT:

Idiopathic Parkinson's disease is one of the most common nervous system disorders of people over 60 and is characterized by a slow degradation of dopamine containing neurons in the brain. Symptoms range from resting tremor and muscle rigidity, to loss of ability to smell, constipation, and cognitive deficits. An effective diagnosis isn't available until the patient is in the late stages of the disease, when serious motor impairments are obvious. The purpose of this study is to determine if cognitive symptoms occur before motor impairments develop which could aid in an earlier diagnosis and improve the quality of the patient's life. In this study, increasing amounts of the neurotoxin 6-hydroxydopamine (6-OHDA) were injected into the substantia nigra of the rat. Their autonomic nervous system function, cognitive abilities, gross motor, and fine motor skills were assessed before and after 6-OHDA treatment. Also, when injected with 6-OHDA, rats food transit time increases and becomes more irregular, which could indicate constipation. However, a direct increase in food transit time with an increase in 6-OHDA was not observed, which could be a result of a misplaced lesion.

Poster # 53/ Life Science

Title of Poster: How do small birds see? Visual field configuration and eye movements in closely related sparrows

Presenter(s): Diana Pita

College: Science

Advisor: Dr. Esteban Fernandez-Juricic

ABSTRACT:

The visual field configuration, along with eye movements, determines the volume of visual space that can be perceived around an animal's head. We examined the visual fields and degree of eye movement in four ground foraging species within the Family Emberizidae: American Tree Sparrows (Spizella arborea), Field Sparrows (Spizella pusilla), White-throated Sparrows (Zonotrichia albicollis), and Dark-eyed Juncos (Junco hyemalis). All species had relatively wide binocular fields, with higher values in the White-throated Sparrows and Dark-eyed Juncos when the eyes converged. Wide binocular fields may improve the detection of seeds under different ambient light conditions. Eye movement patterns varied considerably among species. White-throated Sparrows and Dark-eyed Juncos showed increased eye movement behind the head and below the bill. This may enhance the ability of these species to search for food while head-down by orienting their foveae (i.e., areas with high visual resolution) towards the foraging substrate. Additionally, eye movements to the back of the head may enhance aerial predator detection when animals are head-down foraging. Field Sparrow eye movements increased right above the head, probably to enhance predator detection when head-up, as this species prefers closed micro-habitats where predators may lurk around. American Tree Sparrows showed the lowest degree of eye movement, which may be related to their small blind area at the rear of the head and increased visual coverage. Overall, even closely related sparrow species show differences in their visual field configuration, which appear to be associated through differences in foraging strategies and micro-habitat use.

Poster # 54/ Innovative Technology

Title of Poster: MEMS High Temperature Sensors

Presenter(s): Matthew Scuderi, Sean Scott

College: Engineering

Advisor: Dimitrios Peroulis

ABSTRACT:

High temperature sensors capable of operating in harsh environments have a variety of practical applications. As the importance of fuel efficiency and reliability in engine components rises in society today, sensors capable of monitoring in these harsh conditions become increasingly important. The original motivation came through a project with the Navy to develop sensors to monitor temperature wirelessly inside a helicopter bearing at temperatures up to 200-300 Â°C. The sensors must be able to survive in bearing oil while rotating at thousands of revolutions-per-minute. This project expands upon the application previously mentioned to measure temperatures up to 500 Â°C. By changing the previously established fabrication process and material composition of the sensors, these sensors will provide a new variety of potential applications. The sensors were fabricated in the Scifres Nanofabrication Laboratory at Birck Nanotechnology Center. The new materials used in the sensors were selected based on material properties and previously developed analytical models. The sensors were then tested in an oven to observe performance at high temperatures. After some iteration in the sensor materials as well as packaging materials, a sensor capable of operating repeatedly up to 500 Â°C was developed.

Poster # 55/ Innovative Technology

Title of Poster: The Use of Digital Data Analysis in Flight Training

Presenter(s): David S. Turek, Jonathan Reed

College: Technology

Advisor: Brian Dillman

ABSTRACT:

In recent years the aviation industry has utilized Scenario Based Training to help develop higher order thinking skills. Also, the Federal Aviation Administration requires the use of Scenario Based Assessment by Designated Pilot Examiners (DPEs) during pilot certification exams. More recently, the general aviation community has acquired technology to collect and analyze digital flight data from certain aircraft. Digital data analysis is a new field that when used with Scenario Based Training and Scenario Based Assessment has potential to provide enhanced scenario analysis and a clear picture of a pilots capabilities and limitations. Many advancements must be made in all three areas to reach this stage. We are using digital data analysis to create a system where the capabilities and limitations of a pilot can easily be pictured and then improved upon. With digital flight data we have specific data points for pitch, airspeed, etc. We are working to download flight data to the flight-simulator X-Plane. We can then use the data to recreate the flight. This can be segmented into sections so specific parts of the flight may be analyzed. We hope this provides solid groundwork for DPEs to advance the use of digital data analysis in flight training.

Poster # 56/ Life Science

Title of Poster: Characterization of the Cement Utilized by Oysters for Reef Construction

Presenter(s): Stephanie Edwards

College: Science

Advisor: Jonathan Wilker

ABSTRACT:

Oyster reefs play an important role in marine aquatic life. The cement that oysters produce to construct their reefs allows them to stick to objects and to one another. There is still a lot of unknown information when it comes to this adhesive material (cement). Our research group has determined that the cement used by the eastern oyster is an organic-inorganic hybrid material that is composed of aragonite, calcite and presumably phosphorylated proteins. Since this development, we have been focused on determining additional information on the cement used by both juvenile and adult oysters. To accomplish this goal, our research group has been using techniques such as SEM, XRPD, fluorescence microscopy, and histochemistry. My part of this project has mostly been working with fluorescence microscopy and histochemistry. Through these techniques, we were able to learn even more about the cement in these oysters that is so vital to the marine ecosystem.

Poster # 57/ Mathematics/Computational Science

Title of Poster: Challenges and Efficiency in Research Data Management

Presenter(s): Bomi Kim, Mariana Tafur

College: Science

Advisor: Dr. Johannes Strobel

ABSTRACT:

Analysis of data has been a crucial process to obtain the results in any kind of research areas. In the core of the process, it is important to adequately store and organize the collected data. This process has been a challenge and a time-consuming task for researchers. The research has been conducted to solve such problem and determine the effective methods of research data management. The database of the research data collected from the research 'KNOW' has been used. KNOW is one of the researches of INSPIRE in School of Engineering in which how engineering education influences students in 2nd through 4th grade is analyzed. As a part of the research, a database of the study has been made using the data from the assessments filled out by students in a number of elementary schools in the nation. The study shows that effectiveness of data and database management is significant since it provides secondary researcher an access to the study and can be improved by tracking, double-checking and security. In the future, the challenges of management of research data should be seriously considered and continuous study on this problem is necessary for a better and effective research analysis.

Poster # 58/ Innovative Technology

Title of Poster: Improve Stroke Recovery by Analyzing Patients' Exercises

Presenter(s): Christopher T. Cange

College: Engineering

Advisor: Juan Wachs

ABSTRACT:

Telemedicine is increasingly being used in medical practice and clinical applications to provide excellent remote patient care. The results of this project can be used to determine if telemedicine in the area of rehabilitation is feasible compared to conventional face-to-face medicine. Using the Microsoft Kinect to map the skeleton, the joint movements of the hip, knee, shoulder and elbow can be extracted with gesture recognition algorithms and uploaded to an online healthcare database for further analysis by the patient's medical practitioner. The goal is to decrease patient recovery time and to provide the doctor with instant feedback regarding the joint movements as well as a video record of the exercise performed by the patient. The software is currently capable of analyzing the depth data from the Kinect and using that data to measure the extension and flexion, in degrees, along with the distance traveled by the hand in each of the preliminary exercises. The data collected from the exercises is then uploaded to Microsoft's HealthVault. This data, along with any other results or scores from the exercises, can potentially be examined by a doctor or sent in e-mail to the doctor for easy accessibility.

Poster # 59/ Life Science

Title of Poster: The role of Pulse Rate and Stimulation Depth in Lowering Detection Thresholds for Auditory Cortex Prostheses

Presenter(s): Oliver B. Regele, Jessica Brenner, Andrew Koivuniemi

College: Engineering

Advisor: Dr. Kevin Otto

ABSTRACT:

An important objective of current neural prosthetic studies is determining how to optimally stimulate neural tissue. A common method is to vary the stimulating waveform in order to determine the lowest charge per phase needed to achieve a neural response sufficient to generate a behaviorally detectable sensation, i.e. a detection threshold. Our previous study showed that thresholds decreased with varying pulse rates of stimulation up to ~80Hz, with no further decreases at higher pulse rates. It is theorized that cortical levels have varying maximum pulse rates due to the differing levels of excitability of cell bodies versus axons. To test this effect a microelectrode was implanted into the auditory cortex of the right hemisphere of a rat, which was trained to detect the presence of stimulation using a basic conditioned avoidance task. The rat performed an adaptive task to estimate the ratâ€™s detection threshold. This was repeated using pulse rates of 10, 20, 40 and 80 Hz, at a shallow, middle and deep site on the electrode. Data indicates that with a deeper site of stimulation, there is a higher optimal pulse rate, ostensibly due to the higher excitability of the deeper axons.

Poster # 60/ Innovative Technology

Title of Poster: Experimental Apparatus for Development of Viscous Impeller Heart Pump for Fontan Circulation

Presenter(s): Amber Plee

College: Engineering

Advisor: Steven Frankel

ABSTRACT:

Single ventricle heart disease is the leading cause of death from any structural birth defect in the first year of life. Currently infants with this disease require three high risks open heart surgeries known as the Fontan Palliation. These three operations are famous for their mortality rate as only 50 to 70% of the patients survive. Those who live to adulthood typically suffer from Fontan-related heart disease.

The proposed solution to improve the treatments of the single ventricle heart disease is a mechanical heart pump developed to assist the patients undergoing the surgical procedures or experiencing Fontan failure. The application of this pump may also reduce the number of operations required from three to two or even one, which should both improve the survival rate and the future life conditions of the infants. Reducing the number of surgeries will address some of the chronic problems patients experience during their entire life. This mechanical heart pump is an expandable Viscous Impeller Pump (VIP), which is implanted into the four way intersection known as a Total Cavopulmonary Connection (TCPC).

I have specifically been involved in test apparatus modifications. The experimental setup uses Particle Image Velocimetry (PIV) and Planar Laser-Induced Fluorescence (PLIF) to understand the flow patterns, shear stress, and mixing characteristics of the pump in an idealized TCPC. I have also been involved with flow visualization experiments and pressure data acquisition to assess the performances of the VIP. These experimental results are also used to validate the Computational Fluid Dynamic (CFD) models.

Poster # 61/ Life Science

Title of Poster: Systemic Factors Prevent Osteoblast Differentiation and Disrupt Bone Homeostasis in Multiple Myeloma

Presenter(s): Brittany A. Metzger

College: Science

Advisor: Julia Kirshner

ABSTRACT:

Multiple myeloma is an incurable cancer of plasma cells in bone marrow. Patients suffering from myeloma develop osteolytic lesions that develop from an increase in the activity of osteoclasts, in combination with a decrease in the activity of osteoblasts. When patients enter remission their osteoclast activity returns to normal, but bone lesions do not heal. We propose that there are factors in the plasma of myeloma patients that disrupt bone restoration and the function of osteoblasts. Bone marrow mesenchymal stem cells cultured in media supplemented with plasma from normal donors differentiate into clusters of functional osteoblasts that express known indicators. In contrast, the same cells cultured in media supplemented with plasma from patients in remission from multiple myeloma fail to differentiate into osteoblasts. Electron microscopy revealed that cells grown in different conditions have physical differences. Our study demonstrates the defect in osteoblast differentiation in patients suffering from myeloma and suggests that persistence of bone lesions during remission may be due to the presence of systemic factors in the plasma of patients in remission from their disease. Results provide an insight to defining the mechanism underlying the observed defect and ways to prevent the disruption of osteoblast formation and function.

Poster # 62/ Mathematics/Computational Science

Title of Poster: Model-Eliciting Activities: A Teaching Tool to Promote Engineering Thought-Processes

Presenter(s): Benjamin J. Horstman

College: Engineering

Advisor: Johannes Strobel

ABSTRACT:

Model-eliciting activities (MEAs) are client-driven, engineering-based, open-ended, problem-based learning activities that require critical thinking and problem-solving skills. These activities engage students in thinking about the method needed to solve a problem and the rationalization behind their method. MEAs provide students with an authentic engineering problem, and then require students to create a procedure to solve the problem and provide rationalization for their answer. MEAs serve as a tool for teachers to incorporate engineering into a classroom setting. Due to the cross-curricular nature of these activities, they integrate well with other core curricula such as language arts, math, and science. This integration allows engineering concepts to be taught while reinforcing multiple education standards. MEAs are used to teach mathematical skills, technical writing, and engineering concepts while also reinforcing problem solving, critical thinking, and teamwork. Future research calls for development of an MEA assessment rubric as well as pre/post comparison of MEA solutions completed prior to and following engineering instruction. Results will be used to evaluate clarity in student procedure writing, level of mathematics skills utilized, detail of procedures and changes in sophistication of student solutions.

Poster # 63/ Innovative Technology

Title of Poster: O-Ring Leakage Study for AircaftSythetic and Bio-Synthetic Fuels Development

Presenter(s): Rex Pan, Nathan Kaney, Tim Jeffery

College: Technology

Advisor: Professor J.M. Thom, Professor Lucian Sylvan

ABSTRACT:

Bio-derived jet fuel is an important area of research for aviation, to improve greenhouse gasses and to ensure a stable supply of fuel, and the Department of Aviation Technology has been a leader in this research in its National Test Facility for fuels and propulsion. One of the projects is to develop a means for identifying interactions between alternative fuels and materials used in aircraft seals. There is little currently known about the interactions of seals in alternative fuels. The responsibility of the student researchers has been to: research and define o-ring installations from manufacturers data, design o-ring fixtures, design and fabricate a pressurization rig, adapt pressure sensing and feed the pressure transducer output to LabView, connect pressure sensing information to the NaTeF data collection system, and create a test protocols. The result has been the creation of the o-ring fixture, designed to hold the test rings. The difficulites in this work centered around designing a fixture to load the o-rings in the proper directions, and to provide fluid passages in the fixture to ensure proper emersion of the seals. This is ongoing work, and it is expected that the designs are going to be itterated as the testing continues.

Poster # 64/ Life Science

Title of Poster: Effect of Phase Delay and Symmetry on Detection Threshold of Brain Microstimulation

Presenter(s): Jessica H. Brenner, Andrew Koivuniemi

College: Science

Advisor: Kevin J. Otto

ABSTRACT:

Intracortical microstimulation of the brain is being explored in an attempt to aid the deaf and blind. To identify the optimal conditions for microstimulation, a rat was implanted with a single shank, multichannel microelectrode array. Prior to implantation, the water-deprived rat was trained to detect an auditory tone by avoiding an electrically active water spout. After implantation, the rat performed the same task to detect an electrical stimulus delivered through the microelectrode. This experiment examines the effect of a phase delay on detection threshold. In previous experiments we employed symmetric biphasic pulses (205 Î¼s/phase) and examined the effect of the direction of the first phase and of the phase delay (anodal vs. cathode and 0, 41, 205, and 1024 Î¼s respectively). Recently, the addition of a phase delay has been investigated with the use of asymmetric stimulation pulses. Our results show that the addition of an phase delay does not significantly affect the detection threshold for symmetric or asymmetric biphasic pulses.

Poster # 65/ Physical Science

Title of Poster: Determination of Mechanical Properties of Crystals, Powders and Compacts

Presenter(s): Ning Zhu, Rodolfo Pinal

College: Engineering

Advisor: M. Teresa Carvajal

ABSTRACT:

Mechanical properties is important to ensure a good tablet since powders usually have some tendency to easily or not to compaction. No patient would like a tablet that is chipped or breaks easily or a tablet that does not dissolve and it is solid like a rock! This Study explores the effects of tableting conditions, including dwell time and presence of lubricant, as well as storage conditions on mechanical properties of tablets of several common pharmaceutical excipients which are MCC PH105, MCC PH101 and Starch. Sample tablets were prepared with Carver compressing machine and the yield strength and breakage behaviors were tested by ElectroPuls All-Electric Test Instrument (Instron). It was found that the presence of moisture in storage environment had noticeably reduced tablet strength. In comparison, being stored in dry air, the tablet strength enhanced. Compressing time did not show a significant effect on the tablet strength but by adding lubricant it reduced. In addition, the compressibility of loose powder samples were evaluated by Dynamic mechanical analyzer (DMA). Effects of milling on the powder compressibility were also investigated. The result shows that DMA successfully identified the failure of compressed powders and differentiated the failure strength of different compounds.

Poster # 66/ Innovative Technology

Title of Poster: Experimental Study of an Organic Rankine Cycle

Presenter(s): Wyatt Hodges

College: Engineering

Advisor: Jim Braun

ABSTRACT:

A Rankine cycle is a type of closed thermodynamic system that runs a working fluid through it in order to produce work. A basic Rankine cycle consists of an evaporator to vaporize the working fluid, an expander to extract work from the working fluid, a condenser to condense the working fluid, and a pump to drive the working fluid through the system. Organic Rankine cycles (ORC) are designed for waste heat recovery, specifically to recover energy from a low-grade heat source to generate electricity. ORCs can accomplish this through the choice of working fluid, one that will be vaporized by the low-grade heat source without requiring vacuum pressures in the system. Such requirements are typically met by organic compounds. A test ORC was studied with 2 different scroll-type expanders: a larger Sanden expander, and a smaller AirSquared expander. The Sanden expander was tested with refrigerant 134a (R134a), while the AirSquared expander was tested with R134a and refrigerant 245fa (R245fa). Testing showed that the Sanden expander was able to produce over 180 percent of the power the AirSquared expander produced, but did not operate most efficiently at test points where the system also operated most efficiently, indicating that it is a good match for the system. The Sandenâ€™s peak efficiency was found in the R134a tests, since the built in expansion ratio was in the range of pump speeds and pressure ratios produced by the combination of working fluid and pump. The AirSquared expander using R245fa produced the greatest system efficiencies, as measured by the Second Law of thermodynamics. The maximum efficiency for the expander was reached with R245fa. However, the expander does not operate at its most efficient when the system is at its highest efficiency, indicating the AirSquared expander is not a good match for the system. The overall goal was to gather enough data to be able to develop a model of the system at a later time. These results and the model that will be developed will help in the design of an ORC which can be practically implemented to recover energy from waste heat.

Poster # 67/ Humanities/Social Science

Title of Poster: Modeling Through Design

Presenter(s): Hilde L. Thayer

College: Technology

Advisor: Nathan Mentzer

ABSTRACT:

Research has suggested that students attempting to solve engineering design problem in high school technology and engineering classroom spend the large majority of their time modeling. The study aims to describe, identify and discuss what types of modeling students are engaging in. The report from the National Research Council of National Academies, Engineering in K-12 Education"(2009) has indicated that effective modeling and specifically

Poster # 68/ Life Science

Title of Poster: Determining the relationship between mammary expression of acetyl-CoA carboxylase mRNA and ketotic markers in early lactation dairy cattle

Presenter(s): Alyssa A. Haithcox, Jennifer Crodian, Theresa Casey

College: Agriculture

Advisor: Dr. Karen Plaut

ABSTRACT:

The transition period from gestation to lactation in dairy cows is a time of high energy need. At the onset of lactation the mammary gland of a cow must significantly increase its ability to make milk fat. When a cow cannot obtain enough glucose through feed intake she will start to mobilize fat which puts her at risk for ketosis. The objective of this study was to measure the expression of acetyl-CoA carboxylase (ACACA), a gene that regulates fat synthesis, in mRNA isolated from milk fat to determine if levels change in the mammary gland when cows develop ketosis. To identify ketotic states, levels of ketone bodies, acetoacetate in urine and betahydroxybutyrate in milk were measured in nine early lactation cows at less than 5 days in milk (DIM) and ten cows between 10 and 15 DIM. Cows with acetoacetate levels >40mg/dl and betahydroxybutyrate levels >100 Î¼mol/L were determined to be ketotic. Total RNA was isolated from milk fat and RNA Integrity Number (RIN) had a mean of 4.4 Â± 3.0. Samples with a RIN of 6 or higher were reverse transcribed into cDNA and real time qPCR was used to quantify expression of reporter gene, 18S rRNA and ACACA (n=4 ketotic cows and n=3 healthy controls). There was no difference (P=0.42) in relative expression (RQ) of ACACA in ketotic cows (RQ= 2.00Â± 1.03) and healthy cows (RQ= 1.45Â± 1.27), suggesting that ACACA mammary expression does not vary between ketotic and healthy states. However, when levels were compared between cows at less than 5 DIM and between 10-15 DIM, ACACA levels were found to be significantly different (P=0.038; less than 5 DIM RQ= 0.33 Â± 0.21 and 10-15 DIM RQ= 1Â±0.40), suggesting that level of fatty acid synthesis increases in the mammary during early post-partum period. In the future, it may be worth using a larger sample size of ketotic and healthy cows to evaluate ACACA expression in relation to DIM.

Poster # 69/ Life Science

Title of Poster: Clean Hands Kill

Presenter(s): Aaron Zull

College: Agriculture

Advisor: Dr. Sepulveda

ABSTRACT:

The chemical Triclosan is in many household products. It is in toothpaste, antibacterial hand soap, body wash and some cosmetics. It is being flushed and washed down the drain and entering our waterways. When introduced into the environment it is metabolized into many different chemicals, one of which is Triclocarban (TCC). Triclocarban is showing up in wastewater plants in the US and UK with a concentration of anywhere from 0.4Âµg L-1 to 200Âµg L-1. TCC being recognized relatively recently, there is little known about its effects on aquatic populations that it is being introduced into.

My objective was to determine the LC 50 and LC10 of TCC on Daphnia and see if there are any sub lethal effects such as reduced growth rate. My hypothesis is that even at very low doses we will see an effect on both population and growth rate. I will be testing 5 different concentrations: 1, 2, 5, 7, and 10 Âµg L-1. These concentrations are what can be found in the environment. If it is found that TCC has a significant effect on daphnia survival and growth it may change how the FDA regulates its parent chemical, Triclosan.

Poster # 70/ Life Science

Title of Poster: Sex biasing mothers: a look at sociobiological cues as predictors for maternal biasing of offspring sex ratio

Presenter(s): Kaylin S. Crosby

College: Agriculture

Advisor: Dr. Candace Croney

Co-advisor: Dr. Joseph Garner (email: jgarner@stanford.edu)

ABSTRACT:

A female's ability to manipulate her sex ratio in order to optimize her reproductive success is a fundamental element of evolutionary theory. Abundant literature exists illustrating females can bias depending on cues such as dominance, parental investment, dispersal, and group structure; however, this evidence is usually species specific and only pertains to individuals for a few years at most. Our goal was to test broad sociobiological characteristics that could predict when females would bias across 176 mammalian species. We used data from 90 years of breeding records at San Diego Zoo Global to determine if characteristics of a species natural history could predict possible sex biases. We conducted a comparative analysis using Mesquite v. 2.75 and found the following factors to be key components in a female's ability to manipulate offspring sex ratio: sexual dimorphism ($F_{1,162} = 16.33$, $p < 0.001$); group dominance structure ($F_{1,146} = 9.04$, $p=.003$); and maternal investment ($F_{1,147} = 9.20$, $p=.003$). Our results demonstrate that certain cues can be used to predict possible biasing. Further investigation of these cues could lead to great improvement of today's captive breeding programs and conservation methods.

Poster # 71/ Life Science

Title of Poster: Effects of Phosphorylation and Cyclin A binding on the Subcellular Localization of the Arabidopsis FIZZY-RELATED1 Protein

Presenter(s): Anusorn Mudla

College: Science

Advisor: Dr. Yukiko Mizukami

ABSTRACT:

FIZZY-Related 1(FZR1) protein is an activator of Anaphase Promoting Complex (APC) in recognizing its targets and drives cells into endoreduplication, a process in which chromosomal DNA is successively duplicated in the absence of mitosis. Cyclin A, one of APC targets, is also known as inhibitor of endoreduplication and mutually regulates FZR1 (Imai 2006). However, how exactly this is regulated in the nucleus is unclear. In our study, we examined the regulation of FZR1 by phosphorylation and interaction with cyclin A. FZR1 gene was mutated by altering S(153)>A or D, and RVL(423-425)>AAA to mimic hypo- or hyperphosphorylation and deducted cyclin A binding site, respectively. The mutated FZR1 was then subcloned to obtain 35S:EYFP:FZR1 constructs and introduced into leek cells by particle bombardment. As we expected, the key regulation of the FZR1 protein is phosphorylation because FZR1(S>A) protein localized mainly in nucleus while FZR1(S>D) protein localized mostly in the cytoplasm. Interestingly, unlike we expected, FZR1(RVL>AAA) localized mostly in cytoplasm. The mutated FZR1 genes is also introduced into Arabidopsis thaliana as pFZR1:EYFP:FZR1 via Agrobacterium transformation. The similar localization pattern was observed in FZR1(RVL>AAA) mutant. Nevertheless, the experiment needs to be repeated with other constructs and we need to expand the investigation in developmental pattern to transgenic plants.

Poster # 72/ Physical Science

Title of Poster: Analysis of the Effects of 6-hydroxy Dopamine Surgical Injection for Induced Parkinsonian Symptoms in Rats

Presenter(s): Jeremy N. McGee

College: Science

Advisor: Dr. Kevin J. Otto

ABSTRACT:

Parkinson's disease is a disease affecting as many as ten million people worldwide. The symptoms of this neurodegenerative disorder are progressive and are marked by several distinct features such as difficulties in movement and coordination, as well as cognitive complications. The ability to diagnose Parkinson's disease is limited to the mid-to-late stages of the disease marked by motor difficulties, which limits the effectiveness of treatment options. It is the goal of this project is to determine if cognitive symptoms occur before motor symptoms, which would allow us to identify the signs of Parkinson's disease far earlier than previously possible. As research subjects, rats are surgically injected with 6-hydroxy dopamine in the substantia niagra to kill the dopamine producing cells in the brain. This induces Parkinsonian symptoms similar to those of humans, which allows us to study the symptoms in awake rats. It is the goal of this poster to evaluate the effectiveness of the protocol in use, specifically examining data for evidence if the current methods of artificially inducing Parkinsonian symptoms in rats generates the desired effects. This will be accomplished by comparing the expected results with both behavioral and histological data which is being collected.

Poster # 73/ Humanities/Social Science

Title of Poster: Researching and Surveying Bird Strike Mitigation Practices by Pilots in the United States of America

Presenter(s): Cliff Li-Fu Chang, Bernard Mondal, Patrick Wu, Andy Hoselton, Andrew Patterson, Siddharth Kumar

College: Liberal Arts

Advisor: Donald Petrin

ABSTRACT:

Aircraft hazards perpetuated by bird-strike encounters have long posed an issue in the aviation industry. The results of bird-strikes include, but are not limited to: aircraft damages, rerouting of the aircraft, and compromises of pilot and passenger safety. Many of these consequences induce negative repercussions such as monetary deficiencies. Thus, pilots have various practices for bird-strike mitigation around the world which depends on relative experience and safety training in their respective cultures. Safety management researchers in the aviation field are actively investigating better ways to avert bird-strikes in ways such as looking to other cultures' bird-strike mitigation practices. Our research focuses upon the practices by bird-strike mitigation in the United States of America. Preliminary research has been conducted to aid the development of a succinct survey that was distributed among various pilots in the United States of America. The work on this project is ongoing and results have not yet been aggregated. However, our expectation is that the research and the survey will yield a holistic understanding of the most effective strategies by pilots and safety management researchers to mitigate bird-strikes. Thus, we can utilize this data to procure the most optimal information for minimizing the risk of bird-strike encounters.

Poster # 74/ Life Science

Title of Poster: The sensory basis of individual variation in color vision: a case study with house finches

Presenter(s): Amanda Elmore

College: Science

Advisor: Esteban Fernandez-Juricic

ABSTRACT:

One of the factors that can account for individual variability in decision-making (e.g., mate choice) is that individuals differ in their ability to perceive stimuli with their peripheral sensory systems. In the case of birds, the cone photoreceptors contain carotenoid-based oil droplets, which filter light before reaching the photopigments. Variability in this filtering effect can have important consequences for the perception of different hues. The absorbance of oil droplets has been shown to vary among species, but few studies have looked at intraspecific variation. In this study we used microspectrophotometry to measure between-individual variation in the absorbance of oil droplets in the house finches (Carpodacus mexicanus). Our preliminary results suggest that there is significant between-individual variation in the absorbance of oil droplets associated with different cone photoreceptors (UVS, MWS, LWS) with the exception of the SWS cone. High-performance liquid chromatography was performed to test whether the observed variation in cut-off wavelengths is associated with retinal carotenoid concentrations. It was expected that retinas with higher carotenoid concentrations would have oil droplets whch absorb more wavelengths of light. However, the opposite trend was observed in all types except for C-type. In the future a larger sample size will be used to confirm the negative interaction. If individual variation in oil droplet absorption can be explained by carotenoid accumulation, it would suggest that between-individual differences in diet could result in intraspecific variation in the way that organisms perceive colors, including those in mate choice contexts.

Poster # 75/ Life Science

Title of Poster: Micro-Encapsulating Bacteriophages to Prevent the Spread of Salmonella in Animals During Pre-Harvest

Presenter(s): Marissa Myers, Alexandria Pettigrew

College: Agriculture

Advisor: Paul Ebner

ABSTRACT:

The spread of Salmonella is a very big issue in herd animals like swine and poultry. These are the two main groups of animals we are focusing on in our lab. Our goal is to administer bacteriophages to them that will kill salmonella, typhimurium, ententidis, and kentucky. The problem that we are trying to solve is pigs have a very low pH in their stomach and chickens water, which we would administer the phages through, is chlorinated and the bacteriophages can not survive long enough to do their job. So what we are doing is attempting to micro-encapsulateing these phages so that they can survive all the way to the intestines where the bad bacteria is located. We have not obtained any final results yet but we have tested a few of the encapsulated phages and found that they did not survive in the low pH or chlorinated water, because we tried to do it without poly-L lysine in the encapsulation ingredients to try and make it more affordable. So if none of the phages can survive, we will redo the experiment adding in the poly-L lysine and when that happens we believe it will be a success.

Poster # 76/ Physical Science

Title of Poster: Electrical Characterization of Aluminum Oxide Thin Film by Atomic Layer Deposition

Presenter(s): Yuelu Jin

College: Engineering

Advisor: Zhihong Chen

ABSTRACT:

Nowadays electronic devices are a virtual part of our life, which are based on silicon dioxide. However, due to the nature of material, the fabrication technology has reached its peak which the needs of higher performance increase continuously. Replacing the silicon dioxide gate dielectric with a high permittivity (high-Îº) material allows increased gate capacitance with less leakage current to benefit future industrial applications in processors and other electronic devices. While atomic layer deposition (ALD) of high-Îº dielectrics is rather mature and has already been adopted by industry, a new technique, plasma-assisted ALD (PA-ALD), is expected to open up new routes in thin film growth owing to its increased material choices, high throughput processing and reduced growth temperatures.

In this study, we focus on electrical characterization of high-Îº Al2O3 films grown in a commercial PA-ALD tool, primarily using the Capacitance-Voltage (C-V) analysis. The goal is to identify the optimal growth conditions.

After measuring and analyzing C-V curves of Al2O3 films deposited by various conditions, the major findings are as follows: 1) besides the plasma assistance, 250°C growth temperature results in a higher relative permittivity of 7.1 and smaller hysteresis of 15 mV compared to lower temperatures; 2) Post-growth annealing is necessary to eliminate most trapped charges. It is found that 600Â°C annealing most effectively reduces the hysteresis and oxide trapped charges, and is therefore the optimal annealing choice.

Poster # 77/ Humanities/Social Science

Title of Poster: Developing a System to Measure Teachers' Cognitive Level About Engineering for Use in Improving Teacher-Training Programs

Presenter(s): Miles Evans, Bailey Mantha-Nagrant

College: Education

Advisor: Johannes Strobel

ABSTRACT:

Due to an increased demand for engineering education in elementary schools, a need exists for effective teacher development (Brophy, Klein, Portsmore & Rogers 2008). The Institute for P-12 Engineering Research and Learning (INSPIRE), in 2009 and 2010, facilitated week-long engineering professional development academies for elementary teachers. Thirty-six teachers attended the academy in 2009, and of this group, twenty-two teachers returned for the 2010 academy. As part of a battery of assessments, teachers completed the "What is Engineering/What do Engineers Do" open-ended survey before and following the academies. Responses were matched to levels of the Revised Bloom's Taxonomy (i.e., Remember, Understand, Apply, Analyze, Create, & Evaluate) using a system used previously to code teacher responses in photo journals (Duncan, Diefes-Dux, & Gentry, 2011). The coding system was developed to evaluate teachers' recognition and understanding of engineering. The highest of the two scores is taken as the teacher's score for that year. The current study is centered on refining the coding system, establishing an adequate inter-rater reliability, and coding teacher responses from both 2009 and 2010. After all responses are coded, data will be analyzed and pre/post results will be compared. Results will be used for programmatic evaluation and modification.

Poster # 78/ Life Science

Title of Poster: The release of silver nanoparticles from consumer products and their effects on Zebrafish development and gene expression

Presenter(s): Christopher Klinkhamer, Matthew Stensberg, Cecon Mahapatra

College: Agriculture

Advisor: Marisol Sepulveda

ABSTRACT:

The rapid proliferation of products containing silver nanoparticles in the marketplace has raised concerns over potentially adverse effects resulting from the environmental release of silver nanoparticles. Previous studies have focused separately on the release of silver nanoparticles from consumer products and the risks associated with silver nanoparticle exposure. However, little work has been done investigating the direct effects of silver nanoparticles released from consumer products on early life development and gene expression. For this study Zebrafish, Danio rerio, was chosen as a model organism in order to assess potentially adverse effects to early life development and gene expression as a result of exposure to silver nanoparticles released from commercially available athletic socks. Silver nanoparticles were extracted from the socks by soaking in ultrapure water and gently agitating for twenty-four hours. Total silver content was quantified by inductively coupled plasma mass spectrometry. The sample leachate was diluted to 3.2nM, 32nM and 320nM for the exposure. The LC(50) of nanosilver was 90 nM. Less than 20% survival was observed at 320nM concentration and about 48% of the embryos exposed had severe developmental deformities at this concentration. We hypothesize that silver nanoparticles cause oxidative stress and thus we are planning to study the gene expression of Cyp1a and Nrf2 genes by real-time PCR.

Poster # 79/ Innovative Technology

Title of Poster: Surface Mineralization and Characterization of Palladium Nanoparticles on Genetically Engineered Tobacco Mosaic Virus (TMV) Templates

Presenter(s): Johanna R. Smith, Lucas Guarnaccio, Kristin Wafford

College: Engineering

Advisor: Professor M. T. Harris

ABSTRACT:

Nanoscale production of electronic devices is generally accomplished under extreme conditions, including high temperature or vacuum conditions. In an effort to find a more effective, reliable process, a biotemplate is employed and coated with a metallic Pd coating. These biotemplates are desirable templates due to their controllable structure and size. This process proceeds reliably under moderate conditions, and using genetically modified tobacco mosaic virus allows the palladium chloride precursor to create a continuous coating. This process has been found to be effective in low temperatures, low pressures and without an external reducing agent. Small angle x-ray scattering (SAXS) is used to model the approximate coating thickness. Comparisons of palladium coating cycles with cylindrical models demonstrate an increased coating thickness with each cycle. Other factors are being investigated such as pH, temperature, concentration and experiment time to determine relationships with coating thickness per cycle. This initial palladium coated TMV can be used as a starting point for other coatings and can be used as H2 detection material or electrodes in nanowires. This information can be used to further the investigations of controlling orientation, shape and thickness of coatings for different applications in nanoscale electric devices.

Poster # 80/ Entrepreneurship/Design

Title of Poster: Purdue Global Design Team: Comprehensive water quality analysis and management recommendations for Natuf catchment in West Bank, Palestine

Presenter(s): Kaileigh C. Calhoun, Barnard Mondal, Katrin Holmgren, Rebecca Smith, Sara McMullen, Mike Sheehan

College: Engineering

Advisor: Chad Jafvert

ABSTRACT:

Communities in the Natuf catchment of West Bank, Palestine depend on limited supplies of groundwater for domestic and agricultural purposes. Studies suggest groundwater in this region is contaminated by pollutants (e.g. biological contaminants, nitrates, heavy metals). A lack of infrastructure exists for the management of solid waste and wastewater, especially in rural areas. Communities in the catchment need information concerning the quality of their groundwater and recommendations for improved management.

Purdue University students are partnered with students from Birzeit University in the West Bank to further investigate the issue and develop possible solutions. Birzeit University students contribute water samples, GIS data, and onsite perspectives. Purdue University students (divided into three subgroups) are: (1) modeling the chemical composition of major springs to access their risks, (2) developing a vulnerability map, which can be utilized to plan trash dump sites where water resource degradation will be minimum, (3) designing a pilot constructed wetland for gray water from eight homes, to reduce microbial contamination in the groundwater.

Work on this project is ongoing. The work-in-progress will be presented to stakeholders at a workshop in May 2012, and is expected to identify individuals or organizations willing to partner in sustainable solid waste and wastewater management strategies.

Poster # 81/ Life Science

Title of Poster: Changes in gene expression in response to sucrose addition in cultured soybean seeds

Presenter(s): Maria A. Wong Yau

College: Science

Advisor: Karen Hudson

ABSTRACT:

In plants, sugars do not only constitute an important source of energy but also serve as regulators in gene expression. Several studies have reported that sugars could alter enzymatic, metabolic, and developmental activities in plants. Exploration of the effect of sugars in the expression of genes, early during plant development, can provide cues about metabolic pathways and plants responses to environmental conditions. In this study, sucrose-inducible genes reported in Arabidopsis were tested for differential expression in developing soybeans. Developing seeds were extracted from pods and were cultivated in vitro in controlled conditions. One objective of this study is to define optimal conditions for the in vitro cultivation of developing soybean seeds that will allow a further understanding of how gene expression in seeds is affected by environment and signals (i.e. sugars, hormones, etc.) from the maternal plant. Reverse transcription and qPCR were used to determine variation in gene expression between samples. Results suggest differential expression induced by sucrose in some genes but there is no evidence in expression variation in others. Further experiments and results to be discussed.

Poster # 82/ Life Science

Title of Poster: Coregonid Species Identification By DNA Barcoding

Presenter(s): Katlin Walls, Heather Holzhauer, Dawn Vaughn

College: Science

Advisor: Krista Nichols

ABSTRACT:

The Coregonine fishes are a family of fishes that live in the far-north regions of the world. They are important ecologically and economically. However, it can be very difficult to distinguish the species physically, as morphological characteristics can be similar. Thus, the goal of this research was to use molecular methods to identify Coregonid species caught for subsistence by Native Alaskans in the village of Unalakleet, Alaska. The mitochondrial cytochrome c oxidase subunit I (COI) gene was sequenced using universal primers, which is known as DNA barcoding. This allows for species identification. Then, the sequence was compared to sequences that have been identified, associated with a species, and stored in The Barcode of Life Data Systems (version 2.5). Thus, using the database, the species of 53 individuals was identified. The ability to assign a species to these Coregonine fishes is important because it allows both researchers and fisherman to know with what species they are working. Researchers can learn more information about their research subjects (and perhaps make new discoveries regarding a specific species of fish, such as migration patterns) and fisherman can better regulate their fishing practices so as to prevent endangering certain species of fish.

Poster # 83/ Innovative Technology

Title of Poster: The Role of Oxygen in Lithium and Hydrogen Doped Carbon Allotropes

Presenter(s): Kara Luitjohan, Chase Taylor, Ravindra Kempaiah, Brandon Holybee

College: Engineering

Advisor: Professor Jean Paul Allain

ABSTRACT:

In the area of advanced nanoelectronics, carbon allotropes such as graphene are finding great interest, and in particular, within bandgap engineering. One approach is to tailor the bandgap by doping with alkalis (such as lithium) or irradiate with low-energy hydrogen ions (e.g., deuterium). In thermonuclear fusion, lithium doping is also used. Lithium films are evaporated onto graphite plasma-facing walls resulting in significantly improved plasma performance due, in part, to the unique oxygen-lithium-deuterium chemistry created. Since the various oxides that form on graphene and graphite surfaces alter their respective electrical and chemical properties, we are investigating lithium and hydrogen doping of carbon allotropes while controlling surface oxides. X-ray Photoelectron Spectroscopy (XPS) is utilized to investigate the surface chemistry of graphene, highly ordered pyrolytic graphite (HOPG), and polycrystalline ATJ graphite. Comparing highly ordered carbon allotropes (such as HOPG and graphene) with unordered polycrystalline ATJ graphite provides insight on how various oxides affect the deuterium induced surface chemistry. We have found that oxygen plays a significant role in the chemical binding for both hydrogen and lithium doped carbon allotropes.

Poster # 84/ Physical Science

Title of Poster: Stabilization of the Singlet State for Aromatic Nitrenes via Anionic Pi-donating Groups

Presenter(s): Emily A. Welles

College: Science

Advisor: Paul Wenthold

ABSTRACT:

Nitrenes are molecules containing nitrogen atoms that have six valence electrons, and therefore are very reactive. However, aromatic (benzene-containing) nitrenes can be generated and isolated in the gas phase from the corresponding azide (-N3). All aromatic nitrenes have been found to be ground state triplets, possessing two unpaired electrons on the nitrogen atom. The closed-shell singlet, having paired electrons on the nitrogen, is ~30 kcal/mol higher in energy. It has been shown previously that addition of a pi-donating group para- to the nitrene stabilizes the singlet. In this work, we used anionic pi-donating groups to aromatic nitrenes to stabilize the singlet.

We synthesized p-azidotoluene and p-azidophenol for this study and formed the corresponding anionic nitrenes in a mass spectrometer. Calculations indicate a ground state triplet for the nitrene resulting from p-azidophenol (1) with a singlet 1.5 kcal/mol higher in energy. The nitrene generated from p-azidotoluene (2) is calculated to be a ground state singlet with the triplet 5.2 kcal/mol higher in energy.

Ion 1 reacted with nitric oxide (NOâˆ™) by nitrogen-oxygen exchange, which is characteristic of triplet nitrenes. Upon reaction with CS2, 1 formed SCN-, indicating the presence of a singlet nitrene. These results agree with our calculations and show that the singlet and triplet states of 1 are similar in energy and accessible. 2 also formed SCN- upon reaction with CS2 but did not undergo nitrogen-oxygen exchange with nitric oxide. These observations support our theoretical predictions that 2 is a ground state singlet and contribution from the triplet is negligible. We have shown that a singlet ground state for aromatic nitrenes is indeed possible and that the singlet can be selectively stabilized by introduction of a strong pi-donor.

Poster # 86/ Physical Science

Title of Poster: A Comparison of the Molecular Structures of Field Deposit Asphaltenes to Asphaltenes Precipitated Using Heptane

Presenter(s): Adam P. Cismesia

College: Science

Advisor: Hilkka Kenttamaa

ABSTRACT:

Asphaltenes, the heaviest fraction of crude oil, are of growing concern to the oil industry. They precipitate out of crude oil, clogging pipelines, and they foul catalysts used in crude oil refinement. Despite these problems, little is known about asphaltenes especially at the molecular level. Some research has been conducted on the molecular structures of asphaltenes to help address the issues they pose to industry, but this research has focused primarily on asphaltenes precipitated from crude oil by using heptane (HPA). This work uses tandem mass spectrometry to compare the structures of HPAs to asphaltenes removed from clogged pipes in the field, field deposit asphaltenes (FDA). The goal is to determine whether the structures of HPAs are relevant to FDAs. Tandem mass spectrometry allows ionized compounds of interest to be isolated and fragmented, which provides insight into their molecular structures. This technique has been used previously for HPAs and shown to be useful. Initial results show that FDAs contain longer alkyl chains that emanate out from smaller aromatic cores than the HPAs. Furthermore, FDAs contain significantly greater amounts of sulfur compared to HPAs, but the overall molecular architecture is similar between the samples.

Poster # 87/ Innovative Technology

Title of Poster: Research and Development of Testing Methodology for Use in Preparation of an ASTM Guidance Material and Support of Alternative Aviation Gasoline Acceptance

Presenter(s): Adam J. Landers

College: Technology

Advisor: Mark Thom

ABSTRACT:

Leaded aviation gasoline is under pressure by the EPA to be phased out, but traditional unleaded fuels do not work in aircraft. The National Test Facility for fuels and propulsion in the Department of Aviation Technology has been working to help certify a replacement fuel. Swift Enterprises, Inc. has recently developed a bio-based fuel as a drop in replacement for aviation gasoline. At present the American Society of Test and Measurement (ASTM) has no spec for approving non-petroleum fuels, but is in the process of creating that new spec. This research concurrently creates and validates the proposed materials list and testing process for the new ASTM spec, and determines the effects of Swift fuel on aircraft materials. The tasks are to develop the materials lists, develop sampling methods appropriate to the individual materials, determine what tests make sense, and then test the materials using the methods. These tests included such things as tensile test, durometer, density, and dimensional change. The undergraduate researcher has been tasked with determining how to create research samples, and to develop acceptable sample holders. These tasks involved mathematical calculations, use of geometry to study dimensional change, as well as executing the operation of lab test equipment.

Poster # 88/ Innovative Technology

Title of Poster: A System for Wirelessly Estimating a Vehicles Weight Based on an Air-Ride Suspension Pressure

Presenter(s): Derek L. Hancock

College: Engineering

Advisor: Professor Krogmeier

ABSTRACT:

Semi-tractor trailers often have air suspension systems integral to their design. These systems have been used to monitor approximate load weight with wired communications and in-cab displays. A research and design project by Purdue undergraduate students in Electrical and Computer Engineering has focused on developing a system which displays load weight on a nearby handheld device using wireless technology.

This technology would enable improved load management in a wide variety of agricultural and commercial applications. For example, forage harvester operators would be able to create auto-calibrated tonnage maps in real time, and know the net weight of each load. It also helps semi-tractor stay road legal by measuring the weight on each individual vehicle axle.

The poster will include information regarding the weighing system operation and calibration, as well as information regarding the wireless communication and display of sensor output. It will highlight experiments done with the systems prototype which demonstrate a 90 percentile error of 650 pounds as well as showing that the system is normally within the error rate of current scales used in the trucking industry.

Poster # 89/ Innovative Technology

Title of Poster: Assessing performance in a high-technology, high-risk environment: A user perspective.

Presenter(s): Clay Wildt

College: Technology

Advisor: Dr. Brent Bowen; Dr. Erin Bowen

ABSTRACT:

Previous research on perceptions, satisfaction, and attitudes regarding the major commercial air carriers in the United States has been based on subjective options with lack of quantitative performance data. Building upon 21 years of work with the National Airline Quality Rating, the present study attempts to move beyond basic descriptive information of air travelers to identify attitudinal patterns and relationships in the way consumers at varying levels of travel frequency view this high technology, high risk environment. Development of such a model allows key players the ability to improve their understanding of the prime drivers and perceptions of passenger behavior. The modeling of attitudinal patterns and perceptions plays an important role in determining the need and priority, and potential consequences of such action. This study will exemplify the connectivity between subjective measures as reported by the survey respondents, and the formula driven weighted average that constitutes the Airline Quality Rating. Data will include research results from April 2, 2012 that were released to the national media at the National Press Club in Washington, DC.

Poster # 90/ Life Science

Title of Poster: Impacts of Sewage Waste Water on Feminization and Vitellogenin Expression in Male Fathead Minnows (Pimephales promelas)

Presenter(s): Lexis R. Butler, Jason Doll, Jennifer Meyer, Jessica Leet

College: Agriculture

Advisor: Maria Sepulveda

ABSTRACT:

Estrogenic compounds (primarily from substances like birth control) are commonly found in domestic waste water effluent. These compounds can feminize male fish (e.g., decrease male secondary sex characteristics), and thus negatively impact reproduction. A previous study conducted in 2010 by Jason Doll of the Muncie Bureau of Water Quality examined the effects of domestic waste water on native populations of bluntnose minnows (Pimephales notatus) in the West Fork of the White River in Delaware County, Indiana. Feminization, measured as a decline in the expression of secondary sex characteristics, was observed in the adult males (low tubercle score and count). Exposure to estrogenic chemicals can also lead to the production of female-specific proteins such as vitellogenin (Vtg). Vitellogenin is a yolk-precursor protein synthesized by the liver of egg-laying females after the stimuli of estrogen. We hypothesized that upon exposure to estrogen-containing waste water, adult male fish would express this female-specific protein. Caged adult fathead minnows (Pimephales promelas) males were caged at two different sites in the West Fork of the White River. The downstream group was placed directly under effluent from the Muncie Water Pollution Control Facility (MWPCF), while another group (upstream) was placed 0.25 km upstream from MWPCF. Following a two-week exposure, secondary sex characteristics were examined and livers collected for quantification of Vtg expression using quantitative polymerase chain reaction (qPCR). While no significant differences resulted from comparison of secondary sex characteristics between the study groups, downstream males showed an up-regulation of ~14-fold (SD= 2.5) of Vtg when compared to the control group. This up-regulation of Vtg, coupled with feminization of native populations of bluntnose minnows, suggests the presence of estrogenic compounds in the White River downstream of the MWPCF.

Poster # 91/ Entrepreneurship/Design

Title of Poster: Site design for the Roundtrippers Sports Complex in Westfield, Indiana

Presenter(s): Maria C. Gast, Brian Velleman, Sarah Symons

College: Agriculture

Advisor: Paul Siciliano

ABSTRACT:

Today most communities are no longer limited to a single option for shopping, recreation, and other activities. As a result, owners of these properties must find new ways differentiate themselves from competition. The owner of the Roundtrippers Sports Complex in Westfield, Indiana solicited our help to redo the site design to make his indoor sports complex stand out as it undergoes renovation in the face of competition from a new sports complex in the works. After gathering information concerning the existing conditions of the site, the desires of the owner, and other basic requirements we worked with the owner to develop a site plan that optimizes use of space and promotes site-wide unity using a central plaza as a focal point and side corridors to connect buildings and the parking lot. With this basic layout in mind, we have proceeded to develop a basic design to portion and organize space in a way that accommodates both movement and rest throughout the plaza. We are currently researching plant and non-plant materials to suit the specific needs of the project. Next we will use these materials to fill in the spaces we have created and thus complete the design. Our end goal is to make the site aesthetically pleasing, easy to navigate, and interesting during all four seasons while keeping maintenance requirements low.

Poster # 92/ Life Science

Title of Poster: Maturity Mutants in Soybean

Presenter(s): Yuanjin Fang

College: Science

Advisor: Rex Fodrea

ABSTRACT:

Temperature and photoperiod play an important role in soybean maturity. Soybeans grown in different latitudes are different maturity groups. The flowering time or maturity of soybeans can be affected by the environmental cues such as photoperiod and temperature. Photoreceptors such as phytochrome and cryptochrome can be responsible for regulating the initiation of flowers during the development of soybeans. We have a collection of early flowering soybean mutants that flowers earlier than wild type cultivar. Our hypothesis is that mutations on photoreceptor genes might be responsible for the early flowering mutants. To test our hypothesis and study the genetics underlying early maturity mutants in soybean, I designed primers for candidate genes(phytochrome genes and cryptochrome genes), amplify the target sequence using designed primers on mutant soybean plants, and sequence the target DNA region from mutant plants to screen for mutations that could cause early flowering/maturity in soybeans.

Poster # 93/ Life Science

Title of Poster: The Role of PKL in Embryo Development

Presenter(s): Allison G. Shockley, Amanda Smith

College: Agriculture

Advisor: Dr. Joe Ogas

ABSTRACT:

In Arabidopsis thaliana, PKL is chromatin remodeling factor that promotes the repressive epigenetic mark trimethylation of histone H3 lysine 27 (H3K27me3) and represses gene expression. In pkl plants there is a marked delay in the development of embryos in seeds . We further examined the phenotype of developing embryos in pkl plants to determine if two copies of the gene were necessary to cause the embryos to be delayed. This was determined to be the result of a maternal gametophytic affect through analysis of recriprocal crosses between pkl and PKL plants, where the loss of maternal PKL is sufficient to induce the delay. We analyzed the phenotype of embryos at different ages after development and discovered that the delay was occurring before the first step in development. We examined the contribution of a remodeling factor closely related to PKL, PKR2, by looking at plants deficient in neither, one, or both genes, and found that there is no increased effect with the additional loss of PKR2. Our combined analyses suggest that PKL is acting in a specific maternal gametophytic manner to delay early development of embryos.

Poster # 96/ Life Science

Title of Poster: Disruption of the FAH1 gene in Arabidopsis Thaliana inhibits the ability of the MYB75 transcription factor to increase anthocyanin biosynthesis

Presenter(s): Patrick Mangan

College: Agriculture

Advisor: Clint Chapple

ABSTRACT:

Plants produce many UV and visible light absorbing compounds that protect them from harmful radiation. In Arabidopsis thaliana, sinapate esters and anthocyanins synthesized in the phenylpropanoid pathway protect the plant from damaging light. Enzymatically, ferulate 5-hydroxylase (F5H) converts coniferaldehyde to 5-hydroxyconiferaldehyde, a step necessary for sinapate ester synthesis. A recessive mutation in the gene encoding F5H, fah1-2, eliminates sinapate ester synthesis. Upstream from F5H, the phenylpropanoid pathway diverges, and the biosynthesis of anthocyanins occurs. Surprisingly, fah1-2 mutants exhibit decreased anthocyanin accumulation. The myb 75 overexpressor, pap1-d, causes increased anthocyanin accumulation compared to wild type. Mutants of pap1-d have a 35S enhancer causing anthocyanin hyperaccumulation that leads to intense purple pigmentation. To test the hypothesis that the fah1-2 mutation could still inhibit anthocyanin biosynthesis in pap1-d plants, we excised rosette leaves from fah1-2xpap1-d plants grown under controlled conditions. The F1 generation of the fah1-2xpap1-d cross exhibited visibly reduced purple pigmentation. We quantified anthocyanin accumulation by HPLC. The data indicated less of a decrease in anthocyanin accumulation than we expected. Perhaps differential distribution of anthocyanins in the leaf epidermis and vasculature could cause this phenomenon. Future exploration of anthocyanin distribution could lead to greater understanding of UV protectant compounds in plants.

Poster # 97/ Innovative Technology

Title of Poster: Flash Boiling for Transient Thermal Management

Presenter(s): Andrei Dubitsky

College: Engineering

Advisor: Professor Timothy Fisher

ABSTRACT:

New cooling solutions for highly transient heat sources are in great demand to ensure effective dissipation of the high intensity heat fluxes and to prevent temperature fluctuations and localized temperature spikes, which may damage thermally sensitive components. An approach for addressing these challenges, utilizing phase-change in a cooling fluid triggered by rapid depressurization, and enhanced with porous carbon-based foams, is considered in this paper.

A chemically modified version of the foam containing boron and nitrogen will also be tested, and is expected to enhance desorption enthalpy based on results from previous studies suggesting that this combination is particularly absorptive with the working fluid, methanol.

These enhancements are expected to increase heat transfer rates by facilitating more uniform heterogeneous nucleation of the boiling fluid and to allow greater flexibility in choosing cooling fluids by adjusting the fluid saturation temperature through adjusting the system pressure. As a result this cooling approach can be tailored to meet challenging cooling requirements of heat-dissipating devices during various transient operations.

Poster # 98/ Life Science

Title of Poster: Mutations Changing Transcriptional Control of the proU Transport Gene in Salmonella typhimurium

Presenter(s): Jennifer Franks

College: Science

Advisor: Laszlo N. Csonka

ABSTRACT:

In high salinity environments, cells must be able to maintain an equilibrium between internal and external osmolality. One transport gene in Salmonella typhimurium associated with this ability to survive in stressed environments is proU. No activators or repressors of proU have been identified yet. The purpose of this project is to explore mutations that affect transcription of proU.

A particular strain of Salmonella typhimurium , hereby referred to as ProU, was randomly mutated and the effects of mutation on the expression of the proU-lacZ operon were measured with Î²-galactosidase assays. This was accomplished using a random mutagenesis, where Lac+ mutants were selected. P22 phage mediated mapping allowed for isolation of mutations outside of and far away from the promoter of the gene. Two strains were isolated utilizing these methods, referred to as ProU*1 and ProU*2. Î²-galactosidase assays were performed that suggest elevated levels of enzyme activity in the mutated strains in both a normal environment and high salt stress environment. More research is necessary to pinpoint the location of each mutation and the nature of each.

Poster # 99/ Life Science

Title of Poster: Minimal Promoter Required for Normal FZR1 gene Expression in A.thaliana

Presenter(s): Benjamin Walker

College: Agriculture

Advisor: Yukiko Mizukami

ABSTRACT:

FIZZY-RELATED1(FZR1) protein is an activator of the APC complex by binding to its targets, such as cyclinA. This leads them down the proteosome-proteolytic pathway pushing the cell into endoreduplication, an alternate cell cycle where DNA replication occurs without the subsequent completion of nuclear division and cytokinesis. Since plant size and biomass is determined by a combination of successive mitosis and endoreduplication cycles, understanding the genetic control mechanism of the cell cycle switch may lead to new agricultural applications. Identifying the minimal promoter sequence and the cis-acting transcriptional elements it contains is important in the identification of upstream regulatory components of FZR1. Through a series of deletions in the promoter sequence (pFZR1) an altered expression pattern occurred going from 600bp to 300bp using YFP fusion constructs. The deleted sequence contained TCP binding sites which may function when inverted and are associated with other cell cycle associated genes. When the reversed pFZR1 showed no altered expression pattern the TCP sites were thought to be essential to normal FZR1 expression. In subsequent experiments using both YFP and GUS constructs the TCP sites were knocked out in pFZR1. All deletion and mutation constructs have been used to create transgenic A.thaliana and are presently tested.

Poster # 100/ Physical Science

Title of Poster: Human/User-Centered Design

Presenter(s): Lisa Beckwith, Cameron Nunan

College: Technology

Advisor: Nathan Mentzer

ABSTRACT:

The goal this study was to understand how high school students use the human centered design process during an engineering design challenge.

High school students participated in a three hour design challenge which was video and audio recorded. While they were trying to develop a solution to this problem, we analyzed how they think about the user in the design scenario.

The information we are currently analyzing is based off of a coding scheme that looks deeper in the student's view of identifying stakeholder's profile, safety of the user, and understanding the context of the environment.

Our results are still on the way, but we are seeing that the background of the student plays an important role in how they address the problem and think through the process. Students that have more of an engineering background tend to focus more towards the technical side of design, not as much on how the user is impacted. On the contrast, students that do not have the engineering background, focus more on the holist impact on the user.

Poster # 101/ Life Science

Title of Poster: Use of brassinosteroid (BR) inhibitors to characterize sorghum mutants

Presenter(s): Neil Weber, William Sutherlin, Josh Budka

College: Agriculture

Advisor: Burkhard Schulz

ABSTRACT:

Brassinosteroids (BRs) are important regulators of plant development controlling processes as diverse as cell elongation and stress responses. Most steps in the biosynthesis as well in reception and signal processing have been investigated on the molecular level using Arabidopsis knock-out mutants whereas the knowledge about BRs in monocots and crops is not as developed. Information about BRs in important bioenergy crops such as maize and sorghum is still sparse. To investigate the phenotype of sorghum plants, which are deficient in BR biosynthesis we developed a BR inhibitor screen that allows studying the effect of BR deficiency in sorghum plants.

Treatments of Tx623 production sorghum plants with BR biosynthesis inhibitor propiconazole (PCZ) allowed defining the phenotype of a BR mutant in sorghum. Short-term treatments of seedlings in the dark revealed strong inhibition of cell elongation in above - and below ground organs. Long-term treatments of plants resulted besides in dwarfing of plants due to inhibition of internode elongation, in strong suppression of tiller branching and twisting leaf morphology. Roots show gnarled morphology with a reduced root system. Flowering time is delayed and seed set of BR inhibited plants is greatly reduced.

Poster # 102/ Mathematics/Computational Science

Title of Poster:

Nanoscale approaches to analyze epigenetic regulation of plant gene expression

Presenter(s): Ron Noble

College: Agriculture

Advisor: Burkhard Schulz

ABSTRACT:

Additional layers of information are added (DNA-methylation, regulatory non-coding RNAs and alternative splicing) to existing genomic data. These "meta-levels" can expand the information content of genomes many-fold, but pose also the problem of requiring novel technology to evaluate this information. Epigenetic regulation of gene expression involves the change of methylation stage of genic DNA sequences. We use a transgenic Arabidopsis line that contains a T-DNA insertion in the immunophilin-like TWISTED DWARF1 gene. The transgene, which confers kanamycin resistance to the T-DNA mutant twd1 is silenced in twd1-sup alleles due to increased methylation of DNA sequences of the NPTII (kanamycin resistance gene). twd-sup plants show a weak mutant twd1 phenotype. To analyze the level of rare TWD1 transcripts in twd1 and twd-sup plants we will use surface enhanced Raman scattering and nanoprobes to detect specific gene transcripts. Surface Enhanced Raman Scattering (SERS) involves the use of gold nanoparticles to enhance the Raman scattering signal of biological molecules (DNAs, Proteins, etc) within nanometer distance of signal-enhancing gold nanoparticles.

Poster # 103/ Physical Science

Title of Poster: Synthesis and Characterization of Diruthenium(II,III) Nucleobase Compounds

Presenter(s): Greta Jakstonyte, Will Forrest

College: Science

Advisor: Tong Ren

ABSTRACT:

A series of diruthenium(II,III) nucleobase compounds were prepared using the Sonoghasira cross-coupling reaction between the aryl halide of 5-Iodouracil, 5-Iodo-1,3-dimethyluracil, and 8-Bromo-adenosine and the terminal alkyne of Ru2(D(3,5-Cl2Ph)F)3(DMBA-4-C2H)Cl where D(3,5-Cl2Ph)F and DMBA-4-C2H are N,N'-bis(3,5-dichloro-phenyl)formamidinate and N,N'-dimethyl-4-ethynylbenzamidinate, respectively. All the diruthenium compounds reported herein were analyzed via mass spectrometry (nESI-MS and HR-MS), voltammetry (CV and DPV), and UV-visible and infrared (FT-IR) spectroscopy. The analysis showed that these peripheral modifications do not significantly alter molecular and electronic structures of the ruthenium core, which has a unique spectroscopic and electrochemical signature. Furthermore, other nucleobases, nucleosides and eventually nucleotides can be coupled to the diruthenium complexes and used as sensors for genomic applications.

Poster # 104/ Life Science

Title of Poster: MICROHABITAT SELECTION OF REITHRODONTOMYS MEGALOTIS IN CENTRAL INDIANA

Presenter(s): Jessica Rodkey, Valerie Clarkston, Robert Chapman, Matthew Kraushar

College: Agriculture

Advisor: Patrick Zollner

ABSTRACT:

The eastern-most range of the Western harvest mouse (WHM) occurs in the central regions of Indiana making it a species of concern in the state. Therefore, it is important to understand their local habitat requirements in order to assess their use as an indication of prairie health. Previous live trapping at Purdue Wildlife Area documented the presence of this species at four locations. During the 5-6 years since that trapping, one of these sites became overgrown with woody invasive plants while the other three sites retained characteristics of native prairie-like. We conducted live trapping during fall 2009, spring 2010, fall 2010, spring 2011, and fall 2011 which revealed the continued presence of WHM at the prairie-like sites, but their absence at the site was changed by encroachment of woody invasive plants. Subsequent to live trapping, brush-hogging was carried out in the woody site in fall 2009 and a prescribed burn was implemented in one non-control prairie in spring 2010. Detailed analysis of vegetation around trap locations of WHM before and after the burns showed a positive correlation to dense debris and a thick native prairie grass community. But, WHM were not found in sites that showed dominance by woody plant species.

Poster # 105/ Entrepreneurship/Design

Title of Poster: New Harmony, Indiana: Developing a Cultural Town Sustainability Plan

Presenter(s): Scott A. Peters

College: Agriculture

Advisor: Professor Kent Schuette Jr.

ABSTRACT:

Introduction

New Harmony is a historic town on the Wabash River in Posey County, Indiana with a population at around 1000 residents. Founded German Lutheran immigrant George Rapp 1814, and later sold to Scottish Socialist Robert Owen and William Maclure, the town primarily focused on agriculture and manufacturing. It possessed all the best machinery, offered every variety of employment, and was fully self-sustainable. By 1819, New Harmonists had two story homes on the land, a co-operative food production system, and a thriving urban center. It was a time when the fruits of labor were enjoyed by all. Something must have been working. But why does this concept no longer exist? Could a cultural town sustainability plan be developed that would be embraced by New Harmony's present day 'community of participants'and also serve as a national and international model of self-sustainable living?

Methods

This projects effort will focus on finding the right balance between New Harmony's need for economic growth and sustainable planning strategies. The following designed elements will include; proposed land uses, water management strategies, gateway and corridor design, a food and distribution program, integrated livestock, and a proposed school agricultural based curriculum. The addition of these considerations to the town will positively affect circulation systems (sidewalks, walking paths, vehicle movement, directional signage, and tour routes), downtown market center (promenade), increased local economic base, balanced/restored ecological systems, and preserved historic identity.

Poster # 106/ Life Science

Title of Poster: Differences in female and male directed song in Brown-headed Cowbirds (Molothrus ater)

Presenter(s): Latasha K. Skillman, Andy Lin

College: Science

Advisor: Jeffery R. Lucas

ABSTRACT:

Multimodal signals are important for inter and intra-sexual communication. For example, Brown-headed cowbirds (Molothrus ater) use a multimodal signal consisting of a song and a wingspread display during courtship and aggressive encounters with female and male conspecifics, respectively. The song consists of three components: a low frequency phrase (P1), a 50 msec high frequency interphase unit (IPU), and a series of high frequency sweeps (P2).While the song can be presented without the wingspread display, the wingspread display is never presented alone. While there are differences between female and male directed wing-spread displays, there are no known differences between female and male directed song. However, because the song can function as a standalone signal and is effective in either attracting or deterring conspecifics, we hypothesized that there may be differences in amplitude, frequency and timing for each song component between female and male directed songs. Differences between these songs may help to explain the function of the multimodal signal; if there is no significant difference, it may be that the wingspread display modulates the signals by increasing the salience of the song. If there are differences, it may be that the song and wingspread display are redundant signals.

Poster # 107/ Life Science

Title of Poster: Initial feeding behavior responses of dairy cattle to physical form of added fat

Presenter(s): Abigail J. Nortrup, Shawn Donkin, Heather Tucker, Perry Doane

College: Agriculture

Advisor: John S. Radcliffe

ABSTRACT:

Rumen inert fat is added to diets for lactating dairy cattle to increase the energy density of rations. The objective was to determine effects of addition of pelleted vs. crumbled forms of commercial rumen inert fats on feeding behaviors. Lactating Holstein cows (n=48) were utilized in a replicated randomized complete block design and offered one of four diets over an 8-d acceptance evaluation period. The diets were no-added-fat control diet (C), a prilled-fat source (BP), a pelleted-fat source (EP), and a crumbled-fat source (EC). Patterns of feed intake were determined from feed samples and refusals collected at 0, 6 and 24hr after delivery on d1, 3, 5 and 8. Pattern of TMR sorting was determined using the Penn State Particle Separator to yield long, medium, short and fine particles. For long particles, effect of treatment was significant, as well as treatment by day. Cows sorted against EC and in favor of BP long particles. Concerning fine particles, effect of day was significant, d1 differing from d5 and 8. This data suggests that there is no sorting preference between physical forms of fat (crumbles vs. pellets) but there is a lack of uniformity in response to source of rumen-inert fat.

Poster # 108/ Life Science

Title of Poster: Progesterone Promotes Differentiation of Human Cord Blood Fetal T cells into T Regulatory Cells Providing a Potential Mechanism for Immune Tolerance

Presenter(s): Benjamin Ulrich, Jeeho Lee, Chang Kim

College: Science

Advisor: N/A

ABSTRACT:

Progesterone, a key female sex hormone with pleiotropic functions in maintenance of pregnancy, has profound effects on regulation of immune responses. We report here a novel function of progesterone in regulation of naÃ¯ve cord blood (CB) fetal T cell differentiation into key regulatory T cell subsets within the human model. We found physiological concentrations of progesterone drives allogeneic activation-induced differentiation of CB naive, but not adult peripheral blood (PB), T cells into immune suppressive T regulatory cells (Tregs), many of which express FoxP3. Another related function of progesterone that we discovered was to suppress the differentiation of CB CD4+ T cells into inflammation-associated Th17 cells. These findings reveal a novel tolerogenic nature of CB cells and identify important functions of progesterone in regulation of fetal T cell differentiation.

Poster # 109/ Life Science

Title of Poster: Minimizing Tissue Movement While Imaging With a Moving Microscope Stage

Presenter(s): Aurora L. Shands

College: Science

Advisor: N/A

ABSTRACT:

Laser confocal microscopy is an important technique used for imaging sites of brain in jury in fixed tissue samples. The moving stage of the microscope allows researchers to create panoramic images of larger tissue samples. However those movements have also proven to be a source of difficulty for imaging tissue slices that are in liquid solutions. Movements of the microscope stage often cause the tissue slices to shift laterally in the wells. The resulting panoramic images have a fractured, or overlapping, appearance that severely limits their utility. In addition, tissue may rest at an angle with respect to the microscope, making imaging more difficult. To counteract these difficulties, we developed a method to fix tissue in agarose while imaging. To illustrate our successful results, data obtained from rodent brain tissue is presented. This method is currently being used to image sites of brain injury to better understand tissue response to trauma.

Poster # 110/ Life Science

Title of Poster: Determining appropriate cleaning methods for reduction of Listeria monocytogenes in retail delis

Presenter(s): Steven Chambers

College: Agriculture

Advisor: Dr. Haley F. Oliver

ABSTRACT:

Listeria monocytogenes (LM) is a foodborne pathogen, causing 1600 cases of listeriosis, and 225 deaths per year. The Food and Drug Administration estimates that up to 83% of listeriosis cases from to ready to eat meats originate in retail delis. This study tested the efficacy of new sanitization strategies proposed to reduce LM prevalence in delis. The baseline LM prevalence was determined by six months of monthly environmental sampling of 28 sites with biochemical identification of LM in 30 retail delis. New cleaning methods were implemented over three months then continued thorough the six-month post-intervention assessment of LM prevalence. Baseline percent LM positive was 9.40% overall and 4.50% on food contact surfaces. After the sanitization methods were employed the overall LM increased to 9.97% positive (448/4495), but the food contact surfaces decreased to 3.95% positive (63/1595). Future work should investigate the effectiveness of cleaning practices targeting non-food contact surfaces to reduce L. monocytogenes prevalence in delis overall.

A second goal was to transfer and store 484 L. monocytogenes isolates from Cornell University collaborators to Purdue University. These isolates will be used to study Listeria stress response, genetic diversity, and characterization of Listeria strains present in delis.

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