Jan 1st, 12:00 AM

03. Biology

University of Central Oklahoma

Abstracts from the 2014 Oklahoma Research Day

Held at the University of Central Oklahoma

05. Mathematics and Science

03. Biology

05.03.01 DOK3 Negatively Regulates Rankl-Induced Osteoclastogenesis

Sapana, Kadel , Mary Humphrey

Northwestern State University

Introduction: Osteoclasts (OCs) are unique myeloid cells that resorb bone after activation of specific cell surface receptors including receptor activator for NF-kB (RANK). We have recently shown that downstream of kinase-3 (DOK3) negatively regulates TREM2-DAP12 signaling and inflammatory cytokine production in response to TLR stimulation of macrophages. Our goal was to test the hypothesis that DOK3 negatively regulates TREM2-DAP12 ITAM signaling in osteoclasts. Methods: Bone micro-architecture and histology of sex matched 16 week old control and DOK3-deficient (DOK3ko) mice was evaluated. In vitro osteoclast differentiation and function was investigated. RANKL and TREM2 induced cellular signaling of J774 and primary preosteoclasts was performed. Results: DOK3ko mice have osteoporosis with significantly reduced trabecular bone mass at the tibia and femur whereas cortical bone is unchanged. DOK3ko bones have increased osteoclast numbers compared to control mice. DOK3ko osteoclasts have significantly increased resorption compared to controls. In response to TREM2 crosslinking but not RANKL stimulation, DOK3 becomes phosphorylated. Further studies are underway to determine the effect of DOK3 on ITAM signaling in osteoclasts. Conclusion: In conclusion, our data supports in important role for DOK3 in the regulation of osteoclastogenesis in vivo and in vivo.

05.03.02 Analysis of Human Umbilical Cord Mesenchymal Stem Cells' Expansion Capability In Human Platelet Lysate

Eugene, Deloach

Langston University

A number of studies have recognized mesenchymal stromal/stem cells (MSCs) as an option for the treatment of a wide variety of diseases (Capelli et al. 2011, Ennis et al. 2008, Seshareddy et al. 2008). MSCs are present in almost all organs of the body (Ennis et al. 2008). The most common source for clinical MSCs is bone marrow. Unfortunately, bone marrow can be obtained only by an invasive surgical procedure and the ability of the cells to differentiate into different lineages can vary with the age of the donor (Capelli et al. 2011). The human umbilical cord (HUC) has been considered an alternative source of MSCs to the bone marrow. Most methods to expand MSCs require the addition of fetal bovine serum (FBS) to the growth medium; however, using FBS increases the risk of transmitting animal diseases (Capelli et al. 2007). One possible alternative to FBS for expanding MSCs derived from HUC is the addition of Human Platelet Lysate (HPL) which has been used for expansion of MSCs derived from bone marrow (Capelli et al. 2007). The objective of my project is to investigate whether there is an advantage to expanding HUC MSCs in media containing HPL compared to our standard medium. We expanded the HUC cells in four different media conditions: HUC standard media, 2% HPL media, 5% HPL media, and 10% HPL media. Our hypothesis was that the HUC MSCs would expand better in 2% HPL. Results supported this hypothesis; HUC cells expanded better in 2% HPL media.

05.03.03 Biological Effects of the Neonicotinoid Pesticide Thiamethoxam in Honey Bees

Lauren, Blatzheim , Ahmed Karahan, Brianna Levinson, Corey BowerDilan Ikizoglu, H. Wells, Ibrahim ÇakmakJohn Hranitz, Nazmiye Günes

Southwestern Oklahoma State University

Thiamethoxam is one of several neonicotinoid compounds that are widely used in agriculture currently. Some hypotheses propose these pesticides as a cause of honey bee colony collapse disorder (CCD), since the onset of CCD coincided with the widespread use of neonicotinoids. If used properly in agriculture, bees should encounter doses well below the LD50, which is considered "safe." While sublethal doses may not directly affect mortality, intoxication by pesticides may impair the integration of foraging under ecological conditions enough to affect hive survival. We studied the sublethal effects of thiamethoxam on the motor coordination of captive bees and foraging behavior of free-flying bees, using doses of 1/5 to 1/500 LD50. Motor responses (antennal movement, proboscis extension reflex, leg, and abdomen movement) were tested 4 h after treatments were given to harnessed bees. Foraging was assessed 60-150 minutes after ingestion in free flying bees. At 4 h post-ingestion, motor coordination of bees treated with the 1/5 LD50 dose was lower than motor coordination of control bees. On an artificial flower patch, foragers given doses as small as 1/10 LD50 returned at a lower rate than sucrose controls. The ability of foragers to distinguish between high and low sucrose nectar rewards was impaired at doses higher than 1/50 LD50. Sublethal doses of thiamethoxam disrupted both the components of foraging normally integrated by the nervous system and foraging in an ecological context

05.03.04 Sterile Technique

Allison, Arnold , Shala McIntosh

Northwestern State University

In sterile operations, what are the effects of using correct sterile technique opposed to breaking sterile field of infections rates of post-operative clients? This was an evidence based project that declared sterile field operations are more beneficial than breaking sterile field and not fixing it. The project was built upon a case study that was set up in an operating room in which the operation had a break in sterile field and nothing was done about it, leading to the patient receiving a surgical site infection. After making the case study, interventions and best practices were researched through articles to find the best solution that should have been implemented in the case study. Once best evidence based practices were established, a model study was made that provided how the situation should have been handled differently so that a better outcome for the patient would happen.

05.03.05 Therapeutic Hypothermia in Cardiac Arrest Patients

Heather, Collins , Alex Meltabarger, Heather Newlin

Other

Sudden cardiac death is a major problem and remains one of the leading causes of death in the United States. According to Scirica “most patients resuscitated after cardiac arrest will die of neurological complications” (2013). This research project examined the effects of therapeutic hypothermia on neurological deficits in patients experiencing cardiac arrest, as opposed to normothermia patients. We predicted that therapeutic hypothermia would improve neurological outcomes, which is consistent with recent research on the effects of therapeutic hypothermia. In these studies, cardiac arrest patients were placed in a therapeutic hypothermic state with a targeted body temperature of thirty three degrees Celsius. This temperature was then maintained for a 12-24 hour time period. According to Walters, Morley, and Nolan “There was good neurological outcome at hospital discharge in 49% of the hypothermia group compared with 26% of the normothermia group” (2011).

05.03.06 The Effects of Climate Change on the Distribution of Harris's Sparrow

Lindsay, Jones , Chris Butler

University of Central Oklahoma

Harris’s Sparrow (Zonotrichia querula) breeds in northern Canada and winters in the central United States. Because northern Canada is expected to warm at a greater rate than the rest of the Northern Hemisphere, we hypothesized that the breeding range would shift north and contract, while the winter range would shift north and expand. We used Maxent to determine which bioclimatic variables are most important in determining the species’ distribution. Then we used three (A1B, A2, B1) IPCC 4 climate change scenarios to predict the range of the Harris’s Sparrow into the 2050s. We found that the expanse of suitable wintering area for the Harris’s Sparrow in North America depended on the elevation, temperature annual range, annual mean temperature, and the mean diurinal range. A combination of isothermality, mean temperature of the wettest quarter, mean temperature of the warmest quarter, and precipitation of the coldest quarter were the most important variables affecting the breeding area of the Harris’ Sparrow throughout Canada. We found that the potential breeding range did indeed shift north and contract, while the potential wintering range shifted northeast and expanded. This suggests that the numbers of Harris’s Sparrows will probably decline during the 21st century and that the density of Harris’s Sparrow on the wintering grounds will decline as well.

05.03.07 Relationships between Foraging Strategy and Ectoparasite Load of Neotropical Bats

Ashley, Lonetree

Oklahoma State University

Ectoparasites are an important factor in bat health. External parasites in bats usually consist of mites, ticks, and bat flies. Past studies have shown that roosting preference among bats affects ectoparasite load. My hypothesis was that foraging strategy will affect parasite load. Bats were caught at Las Cruces Biological Station in Costa Rica. Ectoparasites were collected using forceps at the time of capture. Bat species were grouped based on the following foraging strategies: frugivore, piper-specialist, nectarivore, insectivore, omnivore, and sanguivore. The ectoparasite loads of the different foraging strategies were significantly different in several respects. Omnivores had the highest total ectoparasite load and highest arachnid loads. Nectarivores had the highest bat fly load. Frugivores had the lowest total ectoparasite load. These results suggest that ectoparasite load is related to foraging strategy in Neotropical bats.

05.03.08 A Systematic Review of Prehabilitation

Jana, Washington , Emily Wadel, Kelsey Fanning

Northwestern State University

This is a systematic review of prehabilitation utilized prior to total knee arthroplasties (TKA). It was found that prehabilitation improves strength and recovery time post-operatively with no negative side effects to date. The case study examined involved a 69 year old female who had bilateral TKAs. Her treatment plan differed in the two surgeries; in that the first one she did not participate in any type of pre-operative conditioning, and prior to the second she did. The results of this study showed an increase in functional ability and strength by 30% and 50% respectively. Other evidence presented in this review also shows that prehabilitation has positive post-operative outcomes. It is felt that although the evidence to support prehabilitation is growing, there needs to be further research done on this emerging topic that encompass such things as longer prehabilitation program lengths and if long term benefits are gained.

05.03.09 The Effect of Light Intensity on the Growth and Reproduction of Chaetomium Globosum, a Common Indoor Mold

Tara, Gurung

East Central University

Chaetomium globosum is a fungus commonly found in water-damaged buildings. The spores and hyphae can be highly allergenic. In previous research, our lab showed that light regimens play a major role in growth and perithecia synthesis of fungi such as C. globosum. Different isolates of C. globosum were exposed to various time in light. Diameter of growth was measured every 7 days. The amount of ascospore and peritheica synthesis was measured after 21 days. Growth was not signicantly influenced by different light regimes, but perithecia synthesis was greater in the dark when compared to light treatments. Patterns of fungal peritheica synthesis suggest that light stimulates a circadian-like rhythm. Future research will involve isolated and identifying proteins and genes stimulated or inhibited by light. Natural and artificial light plays a major role in the circadian rhythms of all organisms.

05.03.10 Endophytes and Possible Pathogens of Greenbrier (Smilax sp.)

Caleb, Biles

East Central University

Greenbrier (Smilax sp.) is a weed that commonly grows in gardens and wooded areas in Oklahoma. The tough stems and thorns deter travel through wooded areas. The growth habit of the plant will often take up the canopy of more desirable tree species. Removal of the plant is difficult due to the tenacious attachment to the tree it is growing on and over.Greenbriers were collected from various locations in the Ada. Samples were brought back to the ECU laboratory and the leaves were dissected. The fungal samples were allowed to grow on the agar for 7 days, and then subcultured to PDA. Approximately 30 different filamentous fungal isolates have been examined. Genera identified include Stemphyllium, Colletotrichum, Fusarium, Alternaria, Pestalotia, and Aspergillus. The most common fungus observed in plant tissue was Alternaria. Endophytes are found in also all plant species that have been tested. Greenbriers have a impressive ability to survive cold weather and diseases. These survival traits may be due to the endophytic fungi that live in the plant tissue. Further research may lead to an effective bioherbicide.

05.03.11 The Effect of Imidacloprid on Sucrose Sensitivity of the Honey Bee Proboscis Extension Reflex

Trimelle, Polk

Other

The proboscis extension reflex (PER) is an important motor program integrated (with motor coordination of locomotion, other feeding reflexes, memory, learning, and social communication) in the honey bee feeding behavior. In the PER, antennal stimulation with sugar solution, nectar in nature, elicits extension of the proboscis for feeding. Honey bees are very sensitive to sucrose concentration in solutions and can distinguish between nectar rewards in nature and in the laboratory. A sucrose sensitivity test has been widely used in studies of the effects of pesticides on honey bees. Our study investigated the effect of sublethal doses, ranging from 1/5 to 1/500 of the LD50 reported for imidacloprid, on the PER of Anatolian honey bees (Apis mellifera anatoliaca) in a Turkish apiary. We tested the PER using 0% sucrose (water), 10% sucrose, and 30% sucrose solutions at 1h before and after the administration of imidacloprid to harnessed honey bees. Bees in our study exhibited a scaled response to the different sucrose solutions, with a higher rate of response to 30% sucrose solution than the 10% sucrose solution. Repeated measures ANOVA of the PER tests revealed that sublethal doses of imidacloprid at 1/5 LD50 impaired the sucrose sensitivity response in honey bees (Wilke's Lamba=0.549, F=2.819, P=0.0006). At lower doses of imidacloprid (<1/5 LD50), bees did not perform differently than controls.

05.03.12 Experimental Design of the Expression of Sir-2 Levels in Organ Tissues of Calorie Restricted Mice vs. Non-Calorie Restricted Mice

Zach, Zaaza , Kathi McDowell

Northeastern State University

It has been long known that calorie reduction results in an extended lifespan in yeast species and Drosophila. However, this mechanism is not fully understood in mammals. In this experiment we will attempt to measure and compare Sir-2 levels in mice so that we may observe whether or not calorie restriction yields the same results in mammals as it does in yeast species and Drosophila.

05.03.13 Ethnomelittological Classification and Knowledge by a Mixtec Speaking Community of Guerrero, Mexico

Victor, Gonzalez Betancourt , Jonathan Amith, Timothy Stein

Southwestern Oklahoma State University

In addition to being the most important pollinators of both wild and cultivated plants, bees are also deeply embedded in the cultural history of many societies. Archeological and anthropological records indicate that bees were, and remain, an integral part of the cultural knowledge of many Indigenous peoples around the world. Using semistructured interviews as well as field surveys, we investigated the nomenclature, classification, and uses of native bees in Yoloxóchitl, a Mixtec speaking community in the municipality of San Luis Acatlán, along the Pacific Coast of the state of Guerrero, Mexico. Our consultants from Yoloxóchitl demonstrated extensive knowledge of the ecology and natural history of local bees. They classified them on a wide array of morphological, behavioral, nesting, and utilitarian features such as body color, aggressiveness, nesting habits and substrate, phenology, and the utility of their honey. Because they produce honey and wax, stingless bees (Apidae: Meliponini) are the most culturally significant bees for the Yoloxóchitl community, and apparently the Mixtec and other Mesoamerican societies as well. Stingless bee species recognized by Yoloxóchitl Mixtec for the most part correspond to currently accepted taxonomic concepts in bee systematics. In sum, data on the nomenclature, classification, and use of bees in Yoloxóchitl demonstrate the importance of incorporating Indigenous knowledge in scientific studies of bee diversity

05.03.14 Non-Steroidal Anti-Inflammatory Drugs Inhibit Growth and Reproduction of Chaetomium Globosum

Taylor, Glasco

East Central University

Fungi are becoming a greater health concern in home and hospital settings. Some fungi cause serious systemic infections and all fungal spores and hyphal segments are allergenic. The purpose of this research was to determine the possible inhibitory activity of non-steroidal anti-inflammatory drugs (NSAIDs) on fungal growth and reproduction. Non-Steroidal anti-inflammatory drugs inhibit growth and reproduction of Chaetomium globosum. Media, Malt Extract Agar (MEA) and Potato Dextrose Agar (PDA), was amended with NSAIDs including Aspirin. Most of the NSAIDs were effective in inhibiting the filamentous fungus Chaetomium globosum at relatively low concentrations. Acetaminophen and mefenamic acid did not inhibit growth when compared to the control. The most effective NSAIDs in growth inhibition were Flufenamic acid, Fenoprofen, Naproxen, and Ibuprofen. Ibuprofen and Naproxen were the most effective in reducing perithecia production and ascospore production. Preliminary experiments indicated differential banding patterns when C. globosum was grown in naproxen, aspirin and higher concentrations of acetominophen.

05.03.15 Experimental Design: Determination if Rapamycin Treatment of Human Cells Enhances the Association of Sir2 and rDNA

Amina, Gilling , Kathi McDowell

Northeastern State University

Rapamycin, an immunosuppressant, is used in organ transplant patients. The drug prevents the body from rejecting an organ or bone marrow during a transplant. Rapamycin has also been tested in many organisms, such as Mus musculus, mice. and Saccharomyces cerevisiae, yeast. The results show increased life in the organisms. This increase in life is due to the inhibition of the TOR Complex 1 (yeast) and mTORC1 (mice), which leads to an increased association of Sir2 and rDNA. Sir2 and rDNA association has already been determined to prolong life in Saccharomyces cerevisiae, Caenorhabditis elegans, Drosophila melanogaster, etc.(2). This experimental design will test the effect of rapamycin on human cells to determine if there is an increased association of Sir2 and rDNA in the human cells.

05.03.16 Age Structure of a Cross Timbers Forest within an Urban Landscape in Central Oklahoma

Chad, King , Abby Ferguson, Justin Cheek

University of Central Oklahoma

The Cross Timbers Region is a complex mosaic of upland deciduous forest and savanna that covers approximately 4.8 million hectares in Oklahoma and is dominated by post oak (Quercus stellata, Wangenh.) and blackjack oak (Quercus marilandica, Munchh.). In central Oklahoma urban landscapes, several problems threaten remnant Cross Timbers forest tracts including eastern red cedar (Juniper virginiana, L.) invasion and land clearing for suburban and commercial development. The objective of our research was to investigate the age structure and radial growth dynamics of a 49 ha post oak-blackjack oak forest in the city of Edmond, Oklahoma. Increment cores were collected at 30cm above ground level from post oak (n=33) and blackjack oak (n=35) that had a diameter at breast height >10cm. Standard dendrochronology procedures were used to cross date tree-ring series to assign calendar years to each tree-ring. Results indicate that the oldest post oaks and blackjack oaks dated to 1900-1910 at the site. Data analysis suggests continuous recruitment of oak during the 20th century. Several events appear to have affected the growth of oaks at the site over the past decade including drought, an ice storm, and a tornado that may reduce the continued overstory dominance of oak in the face of eastern red cedar invasion and the presence of mesophytic species in the understory.

05.03.17 Effects of Osteopathic Manual Manipulation on Asthma

Joseph, Peters , Kevin Wang

Northeastern State University

Introduction: Alternative medicine has been around since shaman or healers, long before what we consider traditional medicine. Alternative medicine consist of Chinese herbs, acupuncture and spinal alignment, which does not fit into traditional medicine. Andrew Taylor Stills, MD, who founded osteopathic medicine, recognized that alternative medicine could help his patients. Osteopathic Manual Manipulation (OMM) can be used to treat disease such as asthma. Proper alignment can be as important as a diet or medication. National University Hospital Allergy Department conducted research in Copenhagen, Denmark. The study showed that patients preferred active manual manipulation. Approved 5/13, clinical trials are to begin in Europe soon to study affects of OMM on asthma. OMM has only been seen to improve mild to moderate asthma, not severe. Hypothesis: Patients will show subjective and objective improvement with active over sham OMM. Methods: I reviewed Chronic Asthma and Chiropractic Spinal Manipulation: a randomized clinical trial that was published in Clinical and Experimental Allergy, 1995 Volume 25, Clinical Trial #NCT01853189, and Chiropractic Treatment for Asthma? You Bet! Published in Journal of Asthma, 47: 2010. Results: Although people preferred active OMM subjectively. The test results did not show clinical significance. Due to the trial size, there needs to be further research to study the affects of OMM on the spine of a person with asthma, chronic and acute.

05.03.18 Trimethoxy-Cis-Stilbene Exhibits Potent Anti-Tumor Activities via Suppression of AKT Signaling and Cell Cycle Arrest in Virus-Induced Hepatocellular Carcinoma

Hari, Kotturi , Charles Nguyen, Naushad Ali

University of Central Oklahoma

Hepatocellular carcinoma (HCC) is the fifth most common cancer in the world. Chronic hepatitis C virus (HCV) infection and cirrhosis are considered to be major risk factors for induction of HCC. Identification of novel therapeutic agents that target HCV and/or HCV-induced HCC is an unmet medical need. Our study explores the anti-viral and anti-tumor activities of trimethoxy-cis-stilbene (TMS), a synthetic analogue of Resveratrol (RES). HCV subgenomic replicon-expressing hepatoma cells were treated with varying concentrations of RES, TMS or DMSO (control) for 48 hrs. The IC50 values for these drugs were determined based on HCV expression levels in the treated and untreated cultures. Effects of the drugs on cell cycle and AKT signaling pathways were investigated using flow cytometry and protein expression profiles. Cell cytotoxicity of the drugs was determined by MTS assay using normal human hepatocytes (NHH) and hepatoma cells. Both RES and TMS downregulated the HCV RNA and NS5B polymerase levels within 48 hr and showed IC50 values equivalent to 100 μM and 1.0 μM, respectively. However, the NHH viability was not compromised during these culture conditions as determined by cytotoxic assays. The anti-HCV effects were accompanied by cell cycle arrest at G2/M phase for TMS, whereas G1/S arrest was observed for RES. Trimethoxy-cis-stilbene appears to be more potent than its parent compound resveratrol as an anti-HCV and anti-tumor drug in culture conditions.

05.03.19 Assessing Black Rail Detection Probability and Habitat along the Texas Gulf Coast

Jeffrey, Tibbits , Chris Butler

University of Central Oklahoma

The Black Rail (Laterallus jamaicensis) is one of the most secretive birds in North America, and little is known about the habitat requirements of Black Rails along the Gulf Coast. Qualitative observations suggest that this species' population has declined during the last century, and wetland surveys document a substantial loss of breeding habitat. We conducted surveys during the breeding season to estimate occupancy and detection probability for the Black Rail in estuarine wetlands. Surveys were conducted at Big Boggy, Brazoria, and San Bernard National Wildlife Refuges along the Texas Gulf Coast from April to May of 2013. Using a game call broadcasting Black Rail vocalizations, we solicited responses from territorial males and recorded their approximate location. Black Rails were located in two habitat types: salty prairie and high salt marsh. Detection probability varied from 0-36%. Habitat types known to contain Black Rails will be surveyed more extensively in the spring of 2014 to yield information on how these birds respond to burn regimes, hydrology, vegetation composition, vegetation structure, patch size, and other landscape attributes.

05.03.20 β2 glycoprotein I–derived Peptides Alter Angiogenesis in Melanoma Tumors

Kellyn, Pollard

Langston University

Melanoma, a deadly type of skin cancer, causes approximately 10,000 deaths/year in the US. Growth of melanoma requires a constant supply of nutrients and blood. These tumors obtain their blood supply and nutrients by forming new blood vessels through the process of angiogenesis. Beta-2 glycoprotein I (beta-2) is a serum protein that binds to lipids on apoptotic cells and inhibits or slows the formation of new blood vessels. We derived 2 treatment peptides from beta-2 to use as competitive inhibitors. Peptide 296c-s is from the binding domain of beta-2 and is an effective chemotherapeutic when administered prior to tumor formation. Peptide p16SS is a scrambled peptide that was used as a control treatment. We hypothesized that peptide, 296c-s, will inhibit melanoma tumor growth and angiogenesis when administered to mice after tumor formation. We injected B16F10 melanoma cells subcutaneously into male C57BL/6 mice. Tumor size was monitored and recorded until tumors were removed, weighed, and stored for later analysis. Nitric oxide assay and endothelium marker CD31 were used to measure vascular growth. Myeloperoxidase assay was used as an indicator of inflammation within the tumors. Peptide 296c-s significantly decreased tumor volume, inhibited CD31 staining and decreased myeloperoxidase production, suggesting this peptide may be enhancing the immune response. This work is supported by grants from NIH P20GM103418 and AI061691, K-State SUROP, and the NIDDK Step-Up Program.

05.03.21 Taylor Dismuke and K.J. Abraham, Department of Biology Langston University, Langston, Oklahoma 73050

Taylor, Dismuke

Langston University

Azo dyes are widely used in the pharmaceutical, textile, food, and cosmetic industries. Azo dyes are characterized by containing one or more azo groups and are the largest and most versatile class of dyes. Azoreductase enzymes catalyze the reductive cleavage of azo linkages to produce aromatic amines, many of which are carcinogens. The purpose of this study is to investigate the presence and activity of azoreductase enzyme and Enterobactor aerogenes and isolate the azoreductase gene coating for the enzyme. Genomic DNA was extracted from both E. aerogenes using a standard extraction procedure. DNA extracted from both bacteria were analyzed using polymerase chain reaction. Future studies include DNA sequencing and nucleotide analysis of the azoreductase gene.

05.03.22 The Potential Value of Biopharmaceuticals to the Developing World

Holly, McIntyre , Kevin Wang

Northeastern State University

Remarkable strides in the development of biopharmaceuticals, namely in vaccines and antibiotics, have been achieved through molecular pharming methods. Molecular pharming could provide a less expensive avenue for the production of much needed medicines in the developing world. Furthermore, the incorporation of immunoglobulins into the genome of fruiting plants has been achieved. The oral consumption of vaccines would negate the need for injectable vaccinations in many instances. Additionally, the oral route could reduce the cost of administration equipment that is often severely lacking in the developing world. It is reasonable to suggest that a wide array of vaccinations could potentially be developed in such a manner and distributed globally. Cost effectiveness could be maximized if these plants are able to be produced on a local level. One such study in Spain demonstrated that fusion of transcription factors and human IgA with the genome of a tomato plant yielded a product considered safe to consume and is likely effective against Rotavirus in humans. More research is currently needed to explore these options.

05.03.23 The Effect of LKE on Autophagy in N2 C. Elegans

Melissa, Brewer , Andrea Holgado, Ashley Rodriguez, Michael Caniglia

Southwestern Oklahoma State University

Many serious neurological disorders in the world, including Huntington's, Parkinson's, and Alzheimer's Disease, can be linked to decreased levels of cellular autophagy. Conversely, increased autophagy can protect neurons against toxic protein aggregates found in most neurodegenerative disorders. Recent research has indicated that a drug called Lanthionine Ketimine Ethyl Ester (LKE) has been shown to have positive neurological effects. LKE has been found to rescue cells that have been affected negatively by mutations, and more recently has shown positive effects in animals with an induced form of Alzheimer's disease. These promising results give reason to test the hypothesis that LKE, a neurotrofic and protective agent, acts by inducing autophagy. To test this hypothesis, we designed experiments to monitor autophagic gene expression and study their potential upregulation. During the performance of these experiments, we exposed C. elegans to either LKE or a control solutions when developing from egg to adult. Once both groups reached adulthood, nematodes were harvested, the RNA was isolated, cDNA was produced, and finally the levels of expression of the selected autophagic genes were measured using quantitative RT-PCR. Preliminary results from these types of experiments are currently being replicated. Complete data analysis and interpretation will be presented at the meeting.

05.03.24 Angiotensin II Increases TRPV4 Localization to Plasma Membrane in Hypothalamic Neuronal Cell Line 4B: Implications for Water and Electrolyte Homeostasis

Nile, McCullough , Ashwini Saxena, J. Thomas Cunningham

Southwestern Oklahoma State University

Background: Renin-angiotensin system (RAS) plays a crucial role in regulating fluid and electrolyte homeostasis. Vasopressin (AVP), acts on the kidney by increasing water reabsorption. The syndrome of inappropriate vasopressin release is associated with excessive water retention. The molecular mechanism underlying this disorder remains unknown. Purpose: The osmosensitive transient receptor potential vanilloid type 4 (TRPV4) channel is a cation channel that is activated by stretch. We used a rat ligated rat model to demonstrate that TRPV4 protein expression and membrane trafficking is increased in AVP neurons. Using calcium sensitive dye, we noted an increased magnitude in calcium transients in response to TRPV4 agonist, GSK1016790A post-Ang II (100nM) incubation, in vitro. Methods: We used Western Blot technique to identify the effect of Ang II incubation on TRPV4 expression and cellular localization. The 4B cells were grown out in a Hyclone custom media DME/Ham's F12 1:1. The cells were treated for 1 hour with 100nM Ang II. Then, the cells were lysed using RIPA buffer and subjected to Western Blot analysis. Results: The Western Blot technique showed that TRPV4 content in the plasma membrane increases after Ang II treatment. Conclusion: We conclude that Ang II could regulate osmosensitivity by trafficking TRPV4 to the plasma membrane in hypothalamic neurons and may play a role in water and electrolyte homeostasis and dysregulation.

05.03.25 Wound Healing in a Petri Dish?

Danielle, Perlingiere , Cynthia Murray, Evon Yap, Kyle WilliamsSeth Hiddink

University of Central Oklahoma

Tissue contraction is part of the normal wound healing process and this contraction generates tension. Tension can be influenced by transforming growth factor-beta(TGF-β), a fibroblast secretion product, and n-acetylcysteine (NAC), an antioxidant, which can reverse the TGF-β driven contraction of fibroblasts. Fibroblasts, cells which generate tension, were cultured within collagen lattices which were then plated on petri dishes. After incubation (to build up tension), the collagen lattices were released manually and contraction was quantified at six time points within one hour after the release. There were eight experiments in this study which varied by cell types (3), treatments (control, TBF-β, NAC, Acid/Base, or combination), and incubation times (6). Analysis of variance was used to determine differences in mean diameters between: 1) treatment groups at ten and sixty minutes, and 2) one and two minutes within each treatment group. In all eight experiments the greatest decrease in diameter (greatest increase in tension) occurred between zero and one minute. In four of the eight experiments, the TGF-β+NAC treatment groups had the largest diameters.

05.03.26 Role of Mcm10 in Maintenance of Genome Stability

Lakelen, Crain , Sapna Das-Bradoo, Stephen Cates

Northeastern State University

DNA replication, repair, and checkpoint pathways protect us from the lesions that arise during exposure to UV light or other DNA damaging agents. However, problems such as mutations in any of these pathways can lead to an unstable genome which is the hallmark of cancer cells. Research from various labs has shown that DNA replication and repair proteins play an important role in maintaining genome stability. Our laboratory is interested in understanding the role of minichromosome maintenance protein 10 (Mcm10) in preventing DNA damage. Mcm10 is an essential part of the replication fork and plays a vital role in replication fork stability through interactions with proliferating cell nuclear antigen (PCNA), DNA polymerase alpha (α) and helicase. Previous studies from our lab show that Mcm10 exhibits a strong interaction with mediator of replication checkpoint 1 (Mrc1). Mrc1 is involved in DNA replication and serves a crucial role in the activation of S phase checkpoint. Using yeast two-hybrid analysis we have mapped the region on Mcm10 that interacts with Mrc1. Interestingly, deletion of 50 amino acids (150-200 a.a.) on the N-terminus of Mcm10 abrogates interaction with Mrc1 and furthermore, the cells display a lethal phenotype. Our next steps are to confirm this interaction by fluorescence microscopy and co-immunoprecipitation.

05.03.27 Comparison of Survival Rates in Out-Of-Hospital Cardiac Arrest With the use of Continuous Chest Compression Versus Survival Rates of Compression With Rescue Breathing.

Sugandha, Aggarwal , Jeff Howard, Shannon Germain

Other

The purpose of this research was to determine whether there was a significant difference in survival rates for patients in cardiac arrest outside of the hospital when provided with continuous chest compression when compared to the survival rates of those patients who received rescue breathing as well as compression. The main objective of this study was to prove that most cases of cardiac arrest outside of the hospital could see a significant improvement of outcomes if the public were educated to provide chest compression even if they are unwilling to provide rescue breathing as well. It was found that in cases of spontaneous cardiac arrest in which emergency medical services arrived in less than three minutes survival rates were similar between both interventions. A review of previous studies was performed and a list of possible interventions was proposed.

05.03.28 Relationships of Coleopterans and Oklahoma Fleshy Fungi

Clark Ovrebo , Craig Koenigs, Jessica Price, Wayne Lord

University of Central Oklahoma

Fleshy fungi serve as hosts for unique assemblages of insects and other arthropods. The patchy and ephemeral nature of fungal-insect communities renders them ideal platforms for the study of acquisitional dynamics, biogeography, and co-evolution. Despite their unique ecological importance, in-depth knowledge of the relationship between fungi and insects is scant. In an attempt to explore the complex associations characteristic of fleshy fungi and their associated insects, sampling surveys were conducted across central Oklahoma during 2009 and 2010. Samples encompassed 15 fungal genera containing numerous species of insects. Insect specimens were hand picked off the fungi, captured via Berlese traps, or larvae were reared in emergence containers. Fungal genera supporting high insect diversity include Amanita, Armillaria, Pleurotus, Strobilomyces and Tricholoma. This report will mainly address the coleopterans found on fungi. Families repeatedly encountered include Staphylinidae, Erotylidae, Tenebrionidae and Nitidulidae with 17 genera identified. The most common genera found were Pallodes, Triplax and Cyparium. The results so far suggest that there is a preference for the genus Triplax to inhabit Amanita species. In addition, with respect to all insect groups, only coleopterans were found on Pleurotus.

05.03.29 An Improved Tissue Culture Protocol for Direct Shoot Organogenesis in Peanut Mature Dry-Cotyledon and Root Tissues

Ning, Wu , Kanyand Matand, Morgan James, Nicole Newman

Langston University

Peanut is a legume of economic importance. Although biotechnology techniques have been reported in peanut, it has mostly focused on the application of standard organs. Little has been achieved using seed cotyledon, primarily because the limitation of successful in vitro culture for adventitious plant formation; and no protocol has been successfully developed for peanut root organogenesis. The objective of this study was to develop a tissue culture protocol that could induce direct shoot formation in dry peanut cotyledon and root tissue. Mature dry seeds in four explant types including whole, half, diced, and two-side-cut cotyledons and root segments from germinating embryos pre-cultured from 0 to 7 days on hormone-free culture medium were applied. The culturing media contain kinetin, 6-benzylamino purine, 2, 4-dichlorophenoxyacetic acid, or thidiazuron (TDZ) alone or in combinations of cytokinin with auxin. The results showed greatest direct multiple shoots per explant. Greater TDZ concentrations (5-30 mg/l) are recommended for greater number of shoots per mono/side-cut cotyledon (78-93). The proximal region formed more shoots than distal region. TDZ-based treatments induced greater shoot formation in cotyledon than other growth-regulator treatments. No root tissue explants that were pre-cultured more than one day formed shoots. All newly formed shoots were transferred onto control medium without growth regulators for rooting and subsequently grew normally in the greenhouse.

05.03.30 Staphylococcus Aureus Biofilm Secreted Products, Inflammation, and Chronic Wound Healing

Robert, Brennan , Melissa Reeves, Melville Vaughan

University of Central Oklahoma

Each year millions of people are afflicted with chronic wounds such as diabetic foot ulcers, pressure ulcers, and venous leg ulcers, which in part, contribute to a considerable amount of mortality in the U.S. annually. The inability of these wounds to heal has now been associated with the presence of microbial biofilms. Although there is increasing evidence for the presence of bacterial biofilms in chronic wounds, there is a fundamental gap in understanding the role of biofilms in chronic wound pathogenesis. The hypothesis is that products secreted by S. aureus biofilms play a direct role in the prolonged inflammation, including the production of elevated levels of reactive oxygen species (ROS) and reactive nitrogen species (RNS), which in turn play a direct role in the lack of reepithelialization associated with chronic wounds. Various immunoassays are being utilized to compare the effects of S. aureus biofilm secreted products with the effects of S. aureus plantkonic secreted products on human keratinocytes and fibroblasts. Preliminary results indicate that products secreted by biofilm and planktonic S. aureus may have differing effects on keratinocytes and fibroblasts.

05.03.31 Characterization of Three Major Histocompatibility Complex Class II Loci in Neotoma albigula

Lindsay, Stone , Michelle Haynie

University of Central Oklahoma

The major histocompatibility complex (Mhc) is an important component of vertebrate immune systems. Genetic analysis at Mhc loci can provide information on susceptibility to certain viral strains. Neotoma albigula (white-throated woodrat) has been associated with at least three distinct strains of arenaviruses, suggesting an interesting coevolutionary history between the host and virus. In this study, we have been screening three Mhc class II loci to detect genetic variation within N. albigula subpopulations in Arizona. We hypothesize that specific alleles for each locus will be positively correlated with disease susceptibility. Initially, we screened two loci using capillary electrophoresis-based single strand conformational polymorphism (SSCP) analysis. Using this method, we found moderate levels of genetic variation at the loci and little correlation between disease susceptibility and alleles. Due to SSCP optimization issues, we have added a third locus and are sequencing the alleles to confirm their identity. We have optimized the protocol, and our results indicate we have sucessfully screened the Mhc loci for genetic variation. The methods used in this research, as well as previous findings, will be applied to collaborative research project with Texas Tech University and the University of Texas Medical Branch involving the association with N. albigula and arenaviruses.

05.03.32 Effects of Narciclasine on Invasive Properties of H-Ras Keratinocytes

Jing, Herwig , Melville Vaughan

University of Central Oklahoma

Nonmelanoma skin cancer is a type of prevalent keratinocyte carcinoma, including basal cell carcinoma, squamous cell carcinoma, and actinic keratosis. Current studies show that the progression of cell carcinoma is associated with invasion of atypical keratinocytes. Our goal is to characterize migration and transformation of keratinocytes into dermal layers. Narciclasine, a plant growth modulator, is reported to have antitumor effects and regulate the cytoskeleton organization via a Rho/Rho kinase pathway. Published data suggest that narciclasine will increase proliferation, migration, and dermal invasion of H-ras keratinocytes. To test this hypothesis we used a fibroblast-contracted collagen skin equivalent, over-laid with H-ras keratinocytes. The prepared tissues will be processed with a series of histology and antibody staining, after incubated in control media for one week and narciclasine-treated media for one week. The major stain procedure consisting of H&E staining, Laminin-5, keratin-14, vimentin, and p63 staining will be used to determine the effect on epidermal architecture. The direct effect of narciclasine on H-ras keratinocytes will be tested with coverslips to study the phenotypic change of cells under the regulation of signaling pathway. Preliminary results show a phenotypic change of H-ras keratinocytes and potential cytotoxic effects at higher doses. We plan to use a rho-kinase inhibitor to determine whether narciclasine effects are rho-specific.

05.03.33 Review of Transposon-Based Techniques for the Removal of Molecular Marker Genes

Jonathan, Nahmias

Northeastern State University

With increasing prevalence of microbial resistance to antibiotics, removing marker genes present in transgenic plants is a very popular subject of research today. The primary reason for the great research efforts is that it’s thought that when eating food from transgenetic crops, antibiotic resistance marker may be horizontally transferred to disease causing microbes in the gastrointestinal tract. It is still debated whether transmission of markers from genetically modified plants could cause antibiotic resistant microbes to arise, but thus far, there is no evidence that consuming food from a transgenetic crop could be detrimental to one’s health (Yau and Stewart, 2013). However, in a study performed by Labar A, Millan J, Okeke I, et al., there was a 50% increase in the frequency of cases trimethoprim resistance in fecal Escherichia coli from healthy individuals in a Nigerian school (2012). Due to this growing international problem, efforts all over the world are focused on the development of efficient techniques to remove these markers. This poster focuses on methods of marker gene removal via transposon-based techniques. Transposons, or “jumping genes,” are genes that jump from place to place around the genome of an organism. Therefore, if the marker is placed within a transposon, it can “jump” away and insert in another locus or disappear from the genome completely and through several generations, marker free plants can be created.

05.03.34 An Example of Possible Martian Life Using Earth Bacteria Found in Icy Lava Rock Similar to Environments Found on Mars

Patricia, Cooper , Kevin Wang

Northeastern State University

Icy lava rock on Mars is found to be similar to those found also on Earth making it possible to compare whether life could exist in a Martian environment. This is a review (Popa et al, 2012) to see if the icy Martian lava rock containing the mineral olivine could also sustain iron-oxidizing bacteria like those found on Earth. Rock and ice samples were taken from a lava tube ice cave in the Oregon Cascades and then used in cultures with olivine, iron and magnesium in a temperature of 5^0C to isolate what could survive and grow. The bacteria Pseudomonas sp. HerB, which was isolated from the samples, was found to be a good example of what life could be like on Mars' icy volcanic environment near the surface.

05.03.35 Long Term Responses of Rocky Mountain Tailed Frog Tadpoles (Ascaphus montanus) to Wildfire

A.M., Chicas-Mosier

Oklahoma State University

The Rocky Mountain tailed frog (Ascaphus montanus) occupies mountainous stream environments and therefore is less affected by human activities than other amphibians. Over recent decades tailed frog habitat has experienced increased wildfire frequency and severity with climate change, and since 1987, approximately one quarter of the tailed frog habitat has burned as a result of wildfire. Tailed frog tadpole populations have been shown to decline for up to seven years in areas with high severity burns as a result of their sensitivity to warm stream temperature and additional sediment. Based on this research we hypothesized that many years post-fire, tailed frog populations would still be weakened as a result of this fire-related habitat change. Our study supports long term change in population size; however, we did not find significant data supporting these mechanisms as cause for the change. Further studies will need to be conducted into the cause of the long-term tailed frog population change to understand how these organisms are affected by fire.

05.03.36 The Diet of Cercobrachys Winnebago (Ephemeroptera: Caenidae) in two Western Oklahoma Sandy Bottom Streams

Amber, Rymer , Peter Grant

Southwestern Oklahoma State University

Cercobrachys winnebago nymphs inhabit the fine, sandy sediments of streams in western Oklahoma. Sand is an unusual habitat for mayfly nymphs, and so our goal was to determine the diet of C. winnebago in this substrate. A total of four collections in two streams were made in July and August 2012. The gut contents of individual nymphs were removed, placed on a slide, and covered with a gridded cover slip. The contents of 26 randomly chosen grids were counted on each slide and the results expressed as percent occurrence. Overall, the most common items in the gut were VFPOM (82%), sand (13.2%), and UFPOM (2.5%). High and low values for each item were 69.9-88.9%, 7.7-22.3%, and 0.1-4.6%, respectively. All other categories (FPOM, diatoms, unicellular algae, filamentous algae, and animal fragments) occurred less than 1%. These results were consistent among nymphs from both streams and all four sampling dates.

05.03.37 Antimicrobial Effect of Silver(I) Cyanoximate - Coated Surfaces on Biofilm Formation of Human Pathogens

Sarah, Hamilton , Shalaka Lotlikar

Oklahoma State University

Post surgical medical implant infections caused by bacterial biofilms is the most common cause of increased morbidity and hospitalization costs. Currently, there is an increase in the use of metal complexes such as silver by incorporating them into implant materials. This leads to the reduction in the infection rate, while not introducing a toxic effect to the human cells and tissues. Silver (Ag) has been known to exhibit strong antibacterial properties by reacting with bacterial DNA or inactivating enzymes of bacterial electron transport chain. We have previously synthesized eight novel silver(I) organic complexes of cyanoximes designated as Ag(ACO), Ag(BCO), Ag(CCO) Ag(ECO), Ag(PiCO), Ag(BIHCO), Ag(BIMCO), Ag(BOCO). The compounds are non-antibiotic, water insoluble and UV/visible light resistant. Since biofilm formation is an important predisposing factor in the development of implant infections, it is essential to test the effect of these compounds on biofilm development. For this, we selected three human pathogens representing different infection profiles: Pseudomonas aeruginosa, Staphylococcus aureus, and Streptococcus mutans. The compounds at the concentrations of 0.5%, 1%, 2.5% and 5% were embedded into the polymeric light-curable acrylamide composite commonly used in dental practice, and applied onto the surface of 96-well plates. Quantitative 96-well plate crystal violet biofilm assays showed that P. aeruginosa and S. aureus biofilm growth was inhibited completely in

05.03.38 Experimental Design of Lifespan Extension Involving Sir2 and Calorie Restriction in Saccharomyces Cerevisiae Supplemented with Resveratrol

Kimberly, Pahsetopah , Kathi McDowell

Northeastern State University

Researchers use Saccharomyces cerevisiae to study the molecular mechanisms that underlie replicative lifespan extension. One of the most significant findings in lifespan extension is calorie restriction. Calorie restriction mediates longevity in various species including yeast, worms, flies, and mammals. Recent studies reveal other compounds like resveratrol, a polyphenol found in red wine, produce similar effects in yeast. In fact, resveratrol was shown to have anti-aging properties that “mimic calorie restriction by stimulating Sir2, increasing DNA stability and extending lifespan by 70%” (Howitz). Activation of Sir2, a histone protein deacetylase, employs a series of steps that prompt rDNA silencing and reduce rDNA recombination at the rDNA loci. This poster describes an experimental design to analyze Sir2’s role in lifespan extension in yeast strains supplemented with resveratrol. By modifying different genes within the yeast strains, the design will measure Sir2’s influence in aging yeast. The experimental design will examine rDNA recombination, rDNA silencing, and histone protein H4 acetylation as an implication of rDNA’s role in lifespan extensions. Howitz, Konrad T, et al. “Small Molecule Activators of Sirtuins Extended Saccharomyces cerevisiae Lifespan.” Nature 425.6954 (2003):191-196 Medline. Web 2. Nov.2013

05.03.39 Sex Differences In Blood Pressure And Renal Handling Of Sodium In Mice On A High Salt Diet.

Heba, Hammami , Alexander Rouch

Northeastern State University

Introduction:High salt consumption contributes to hypertension. A previous study showed that female mice had lower renal exertion of sodium (Nae) than male mice for a 15-day period of high salt consumption. The study goal is to determine if sex differences in Nae and blood pressure (BP) occur from a 30-day period of high salt consumption in mice. Methods:Female and male 12-week old mice (n=6/group) consumed a 4% salt diet in metabolic cages for 30-days. Nae was determined from daily measurements of urine sodium concentration and urine volume. Sodium intake (Nai) was determined from daily food intake. BP was measured via the tail-cuff method in each mouse. Real-time quantitative PCR was used to measure expression of renal sodium transporters. Results:For the 30-day period of high salt consumption, average Nae/Nai was significantly lower in female mice compared to male mice(53.3±2.7vs68.1±1.8, respectively,$p<0.0001$) in addition to the mean BP(78.4±1.0vs84.9±1.2 respectively,$p<0.0005$). Expression of the mRNA for the sodium transporter NKCC was over 5-fold higher in the female kidney. Conclusion:Female mice retain more sodium and maintain lower BP under high salt consumption compared to male mice. Estrogen likely plays important roles in both higher sodium retention and lower BP in the females. This study indicates that female mice exposed to a high salt diet are protected from hypertension for a 30-day period despite higher sodium retention.

05.03.40 Mistletoe's Cancer Treatment Potential: A Review of Down-Regulation of Some Mirnas by Degrading Their Precursors Contributes to Anti-Cancer Effects of Mistletoe Lectin-1 by Lin-Na Li, Hua-Dong Zhang,

Daniel, Tinervia

Northeastern State University

In the United States, when we hear mistletoe we think of kisses on Christmas. However, mistletoe may hold far more potential than inducing affection on holidays. While American mistletoe is used decoratively, European mistletoe (Viscum album L) is being researched as a complementary cancer treatment. Complementary treatments are used in addition to traditional treatments such as chemotherapy and radiation therapy. Mistletoe has been a popular homeopathic plant in Europe, especially Germany. It has been used for circulatory and respiratory problems. European mistletoe is a semi parasitic plant that grows on several types of trees. When used for cancer treatment, reports of improved quality of life and survivorship have been common. The active components responsible for mistletoes immune-system-stimulating and cytotoxic properties are viscotoxins and lectins. More focus has placed on research of the lectins, especially ML-1. Lectins are carbohydratebinding proteins involved with the biological recognition phenomena. While several promising results have been reported, the validity of the experiments is questionable. Almost all trials have had major design weaknesses. Some studies had to small of a test group. Other studies lacked a control group. In a particular study, the concentration of drug varied by +/- 20 ng/ml from the manufactory. That strength variation led to over half the test patients being under dosed. Mistletoe shows great promise to be a complementary t

05.03.41 Bioinformatics of the Apolipoprotein E protein in Alzheimer's Disease

Deborah, Bowman

Langston University

INTRODUCTION: During this academic year, I investigated both Bipolar Disorder (BPD) and Alzheimer's disease (AD). Whereas BPD is characterized by the highs of mania and the lows of depression and often rapidly cycling between the two, AD involves parts of the brain that control thought, memory and language. Whereas BPD has three categories (BPD I, BPD II and Cyclothymic Disorder), AD has three stages (mild, moderate and severe). It is estimated that 5.7 million Americans suffer with BPD and that 5.1 million Americans suffer with AD. AD leads to nerve cell death and tissue loss throughout the brain causing the brain to shrink dramatically, affecting nearly all its functions. The apolipoprotein E protein (apoe gene) is a cholesterol carrier that is found in the brain and other organs. The protein's exact role in the development of AD is unclear, however the genetic test to verify AD is apoe testing. Scientists estimate that APOE-e4 may be a factor in 20-25% of AD cases. OBJECTIVE: Identify the apoe mutation in AD using bioinformatics. METHODS: We visited approximately fifteen databases and generated a bioinformatics workflow to investigate apoe. RESULTS/ COMPARISON: My aim was to display the actual gene mutation along the T- coffee multiple sequence analysis. CONCLUSION: In order to compliment this project, we need to collaborate with a comprehensive university that has the resources to generate apoe knockout mice with memory deficiencies for clinical evaluation for AD.

05.03.42 Elucidation of the Bile Salt Sensitivity Gene Locus in Escherichia coli

Jim, Bidlack , Angeline Satchell, Anna Graves, Jonna WhetselRachael Scott, Sandra Leke-Tambo

University of Central Oklahoma

Investigations are being pursued to isolate, clone, and characterize DNA that appears to be at, or in the vicinity of, the yciS and yciM genes in Escherichia coli. The target DNA encodes for bile salt sensitivity, which, if confirmed, would necessitate a modified description of loci for the genes involved. Currently, we are working with E. coli strains BW25113, JW1271, JW1272, JC3272F, and JC3272I. We are amplifying DNA with primers for the genes involved, and then visualizing the products with gel electrophoresis. The team has been successful at amplifying some strains of E. coli. but there have been some challenges with other strains. The next step will be cutting with restriction enzymes and cloning the target DNA through use of a plasmid. This will be followed with transformation of the bile salt sensitive gene into resistant strains to see if this causes wild type bacteria to become sensitive to bile salts.

05.03.43 Further Investigations of Photovoltaic Cells Using Plant Pigments

Jim, Bidlack , Baylee Tatum, Brian Tetreault, Hunter Porter

University of Central Oklahoma

Additional experiments are being pursued to determine the viability of using various plant pigments and parts, from the same plant, in dye-sensitized solar (photovoltaic) cells. Cells were created using glass doped with a thin film of tin oxide, one side with titanium dioxide annealed onto the plate and then treated with various plant-derived materials, serving as the anode, and another was coated with graphite, acting as the cathode. Anodes were treated drop-wise with chlorophyll, chloroplasts, and anthocyanin extracted from the leaves of Purple Heart (Tradescantia pallida) in order to impregnate the titanium dioxide with dye. Lugol's solution (KI/I2) was added as an electrolyte and the two cell halves were fixed together using super glue. Cells were then connected to a voltmeter and output was measured. Output of various cell treatments are currently being evaluated in a longevity study using a Pico Recorder. At this time, treatment cells are producing at least 200 millivolts (open circuit) with some cells boasting over 1,000 millivolts of output for periods of time.

05.03.44 Assessment of the Bile Salt Sensitivity Gene Locus in Escherichia coli

Jim, Bidlack , Angeline Satchell, Anna Graves, Jonna WhetselRachael Scott, Sandra Leke-Tambo

University of Central Oklahoma

This project focuses on a chromosomal mutation which may cause bile salt sensitivity in Escherichia coli. Previous experiments have shown that the mutation is located at or near the yciS and yciM genes. The current focus of the research is to confirm that the mutated strain of E. coli shows bile salt sensitivity. To demonstrate bile salt sensitivity, a process similar to a minimum bactericidal concentration test is performed on five strains of E. coli, including the mutated strain, a wild type strain, a common laboratory strain, and two knock-out strains - one lacking the yciS and another lacking the yciM gene. A sister project is currently evaluating the sequence of the mutation using a polymerase chain reaction to pinpoint and replicate the sight of the mutation. Once both components of the project are complete, the mutated sequence will be cloned and placed into a plasmid in an attempt to transform a resistant strain into a sensitive strain. The results from this experiment will provide information for modified descriptions of the yciS and yciM genes.

05.03.45 The Economic Impact of Plant Molecular Farming and it's Increasing Popularity of Potential Use in the Medical Community

Shaina, Riggs , Kevin Wang

Northeastern State University

Plant molecular farming (PMF) is the industry of harvesting genetically modified plants for the use of recombinant protein in vaccines, antibodies, as well as other medicinal, therapeutic, agricultural, and economical purposes. The practice of molecular farming involves inserting DNA, with specifically encoded sequences, into an organism's genome via selective markers thus creating recombinant proteins used in the end product. The technique of transforming plastids emerged in the late 1980's and is currently making its way to consumer use. Even as the process is well under way, there are still many biosafety concerns that must be addressed and resolved before these products reach the consumer. Despite the risks, PMF could prove invaluable for developing countries that are unable to acquire necessary medicines and vaccines due to high market values. The costs associated with production, purification, storage, and transportation are substantial and PMF could prove to be a much cheaper alternative.

05.03.46 A Proteomic Approach to Identify Novel Interactions of MCM10

Bobby, Bezinque , Chance Hendrix, Dillon Cave, Sapna Das-Bradoo

Northeastern State University

A proteomic approach to identify novel interactions of Mcm10 Bobby Bezinque, Dillon Cave, Chance Hendrix and Sapna Das-Bradoo Department of Natural Sciences, Northeastern State University-Broken Arrow Maintenance of genome integrity is essential for cancer cells. Problems in DNA replication can lead to an unstable genome. One protein that has been implicated in this process is MCM10. Recent studies have shown that down regulation of MCM10 can cause genome instability which can eventually lead to cancer. Mcm10 is a conserved eukaryotic DNA replication factor that is known to interact with other DNA replication proteins. The focus of our research is to understand how Mcm10 functions to prevent our DNA from damage. To address this question, we decided to purify Mcm10 and understand its interaction at molecular level. We used budding yeast as a model system for our study. We first purified His-tagged Mcm10 from yeast using Nickel-NTA columns. This process was done under non-denaturing conditions. We were successful in purifying yeast Mcm10. This was confirmed by SDS-PAGE and Coomassie Blue staining. Our future studies are focused on scaling up this process to obtain a large amount of purified protein concentrate which will be then analyzed by mass spectrometry. Furthermore, we would like to study these interactions of Mcm10 under normal DNA replication and DNA damage conditions.

05.03.47 Elimination Processes of the Selectable Marker

Samantha, Huffman

Northeastern State University

05.03.48 Effect of Membrane Elasticity on the Assembly of HIV Gag Proteins in vitro

Rui, Zhang , Christine Morse, Donghua Zhou

Northeastern State University

The Human Immunodeficiency Virus (HIV) is the cause of the acquired immunodeficiency syndrome (AIDS) and therefore a very important type of virus to study. The assembly of HIV follows a unique pathway: The viral capsids are assembled right on the membrane of the host cell. The membrane is stretched and bent when the viral capsids are assembled and budded out. Therefore, the elasticity of the membrane should play an important role in the assembly process. In this study, giant unilamellar vesicles (GUV) with different lipids of different elasticity are formed in vitro, and Gag proteins, the main structural proteins of HIV, are injected to assemble. We use both electron microscopy and flue recent microscopy to detect the assembled virus-like particles. Our preliminary result shows that the elasticity of the membrane indeed affects the assembly product and speed. This work may help understanding the mechanism of HIV assembly and shed light on assembly-oriented medical treatments of AIDS.

05.03.49 An Organotrophic Medium as a Substitute for Stolen Chloroplasts

Stephen, Fields , Kaitlyn Riddle

East Central University

Gymnodinium acidotum is a freshwater dinoflagellate that employs a nutritional strategy known as kleptoplasty. The dinoflagellate ingests Chroomonas coerulea, a unicellular cryptophycean alga that has a single chloroplast. Organelles of the prey cell are sequestered within G. acidotum for weeks, and the dinoflagellate depends on photosynthates from the stolen chloroplasts for sustained growth. The purpose of this study is to produce cryptomonad-free G. acidotum cultures, because the presence of the cryptophycean organelles has complicated characterization of the G. acidotum genomic sequence and gene expression. In order to obtain axenic, aplastidic cultures of G. acidotum, supplementary organic compounds must replace products ordinarily furnished by the kleptoplasts and bacterial flora. Bacteria-free cultures are first produced through treatment with a cocktail of cell-wall inhibiting antibiotics that includes meropenem, cephradine and carbenicillin. Dinoflagellates are then suspended in F6 medium (an inorganic algal medium) enriched with glucose, glycerophosphate, histidine and glycine. Dinoflagellate populations continue to divide and grow in this media for several weeks, but eventually die, even after subculturing to fresh, enriched media. This indicates a deficiency of complex, organic substrates. We are currently testing dilute versions of Saccharomyces cerevisiae complete media, which supplies the range of amino acids, an ammonia-based nitrogen source and glucose.

05.03.50 A Helminth Parasite Survey of the Sonoran Mud Turtle (Kinosternon sonoriense): Implications of the Evolution of Parasite Resistance

Kristen, Bliss , Chris Butler, Paul Stone, Wayne Lord

University of Central Oklahoma

The parasite-host relationship has been thoroughly documented across many taxa; its implications are wide-reaching with the propensity to affect overall host population health, fitness, community structure, and the biodiversity of many species and ecosystems. Disease resistance has long been thought to have strong genetic and possibly even environmental components with studies suggesting heritable parasite resistance among both wild and domestic populations. The Sonoran mud turtle (Kinosternon sonoriense) provides a unique opportunity to explore parasite burdens within a stochastic environment prone to severe seasonal water fluctuations. Fecal samples were opportunistically hand-collected during routine sampling from May 2012-August 2013 and preserved onsite using Zinc-PVA solution or 10% Formalin solution. Samples were concentrated and examined under light microscopy for the presence of Helminth eggs. One sample was found to contain trematode eggs of the genus Telorchis (Trematoda: Telorchiinae) in low abundance (3-5 eggs/ 0.05 mL). These findings indicate a parasite prevalence of 3% within these populations. This level of infection is well below the majority of published studies within wild, aquatic turtles and could suggest enhanced systems of parasite resistance. Further investigation into the possible causes for such low parasite burdens and the origins of parasite resistance within this species is warranted.

05.03.51 The Transcriptome of a Kleptoplastidic Dinoflagellate and its Cryptomonad Prey

Stephen, Fields , Brent Biddy, Josh Belcher

East Central University

Gymnodinium acidotum ingests and sequesters chloroplasts and other organelles from Chroomonas coerulea, a blue-green cryptophyte. This mode of nutrition, known as kleptoplasty, may represent an early stage in the route to chloroplast acquisition. The purpose of this investigation is to utilize RNA-Seq and quantitative PCR to elucidate the genetic regulation of kleptoplasty. For RNA-seq, C. coerulea and G. acidotum RNA was isolated with the Qiagen RNeasy reagents, and cDNA libraries for Next Generation Sequencing were constructed with the TruSeq RNA sample preparation kit. Sequence was obtained from the Illumina HiSeq 2000 platform, and the assembled transcriptome data was annotated by BLASTX homology searches against protein databases and mapped to pathways using the KEGG annotation service (KAAS). Primers for cryptophyte genes encoding proteins participating in photosynthesis will be used for Real Time PCR to quantify expression of the transcripts in single cells of C. coerulea and G. acidotum. In this way, we will begin to identify genetic components of the cryptophyte that remain functional during sequestration and can track changes in expression as kleptoplasts age within the dinoflagellate.

05.03.52 Molecular Mechanisms of Calcium Regulation in Pseudomonas Aeruginosa

Michelle, Waner , Kerry Williamson, Manita Guragain, Marianna PatrauchanMicheal Franklin

Oklahoma State University

Pseudomonas aeruginosa is an opportunistic pathogen that causes nosocomial infections and chronic infections in the lungs of cystic fibrosis patients. Previously we have shown that calcium (Ca2+) induces virulence in P. aeruginosa. Genome-wide microarray analysis identified a two-component regulatory system PA2656-PA2657 to be highly induced by 10mM Ca2+. Bioinformatic analysis revealed that PA2656-PA2657 two-component system is highly conserved among all sequenced pseudomonads. Microarray analysis of the mutant lacking a transcriptional regulator PA2657 showed that PA2657 positively regulates two genes encoding predicted periplasmic proteins PA0320 and PA0327. We hypothesized these proteins play a role in Ca2+ homeostasis and Ca2+ induced virulence in P. aeruginosa. Mutants with disrupted PA2657, PA0320 and PA0327 were tested for survival at high Ca2+ concentration. The lack of PA0327 caused significant reduction of growth at 10mM Ca2+. Swarming motility is known to be required for biofilm formation in P. aeruginosa, and earlier has been shown to be induced by Ca2+. Therefore, the mutants were also tested for Ca2+-induced swarming. Although, there was no effect on swarming distances, the mutant lacking PA0327 showed strikingly different colony morphology and a lack of pigment when grown at 10mM Ca2+. Current experiments aim to study the role of PA0327 in Ca2+-induced pyocyanin production. Future studies will focus on the role of PA2656-PA2657 in P. aeruginosa virulence.

05.03.53 Two Proteins may Preserve Red Algal Photosynthesis from High Light Damage

Sukyoung, Kwak , Steven Karpowicz

University of Central Oklahoma

One helix protein (OHP) is associated with the photosynthetic apparatus in green plants and is necessary for recovery of photosynthetic activity after exposure to high light levels. Photosynthesis is well-studied in green plants, but not in other photosynthetic eukaryotes. Red algae are distant relatives to green plants. In the red alga Porphyra umbilicalis (nori), we have identified several genes encoding proteins that are homologous to proteins involved in protection of photosynthetic ability in green plants. To identify whether the function and regulation of Porphyra OHP is similar to green plant OHP, we are using Chlamydomonas reinhardtii, which is a green alga and P. umbilicalis to examine mRNA gene expression. Green plants' OHP mRNA and protein expression responds to high light intensity, so we will investigate the regulation of the protein by checking expression of Porphyra OHP mRNA before and after high light levels by using qPCR. We created an artificial microRNA to knock down expression of the OHP gene in Chlamydomonas, performed molecular cloning of the amiRNA, transformed E. coli, and isolated the plasmids that have amiRNA insert. We are transforming Chlamydomonas with the plasmids and expect the cells to have a high light-sensitive phenotype. We will then perform a genetic complementation of Chlamydomonas with the homologous Porphyra OHP gene. We intend to demonstrate the function of Porphyra OHP and whether it would have the same function as green algae OH

05.03.54 A Review of Moxibustion

Tanner, Ryan

Northeastern State University

I compiled some information on the subject of Moxibustion. Moxibustion has some real and positive effects on the body. Moxibustion is a treatment that stimulates specific acupuncture pressure points that of the body. This is accomplished by burning a herb at these points on the body. The points on the body where these herbs are burnt stimulate blood flow in different areas of the body, this allows moxibustional therapy to nerves, stroke, and other physical ailments of the human body.

05.03.55 Caffeine Effects on Myofibroblasts: A Class Research Project

Melville, Vaughan

University of Central Oklahoma

Caffeine has been tested in vitro on cardiac muscle cells and its effects are well known. Recently caffeine was shown to reduce fibrotic conditions in animal studies. Since myofibroblasts participate in fibroses, our goal was to determine whether caffeine affected the myofibroblast phenotype. This project was undertaken by the Molecular Cell Physiology class in the Biology Department at UCO. Research teams of 3-4 students each used a specific assay to test caffeine's effects. Students cultured rat dermal fibroblasts in the presence of transforming growth factor-beta to induce myofibroblasts, and in the presence or absence of 5mM caffeine. When fibroblasts were grown under immediate tension, caffeine mostly affected cell shape and reduced proliferation. When cells were grown in collagen lattices, where tension is generated slowly, cells became rounded and died. These differences suggest that caffeine greatly affects rat dermal fibroblasts' ability to function under reduced tension conditions. The goal of this semester's class is to determine what effect caffeine will have when tension is already generated in the collagen lattice.

05.03.56 A review of Electronic Cigarettes Student: Doreen Yang Instructor: Dr. Kevin Wang, Northeastern State University

Doreen, Yang

Northeastern State University

Electronic cigarettes are used primarily to quit smoking. While they may possibly be helpful for this purpose, numerous suspects are concerned about potential toxicity. There are few and scarce studies posted publicly on electronic cigarettes that suggest research is urgently essential, primarily on the efficiency and toxicity of these devices. I review the current evidence on the safety and effectiveness of electronic cigarettes. Some of the study cases selected electronic cigarettes that were most popular in markets, while others did surveys of volunteers who were users and non-users of electronic cigarettes. Levels of nicotine were analyzed using gas chromatography. Electronic cigarettes were purchased online from vendors and analyzed, concluding the levels of nicotine as lower compared to regular cigarettes. Though they are not FDA approved, they still seem to be available everywhere from the internet to the mall. More severe chemical studies are necessary, along with extensive research.

05.03.57 Initial Steps towards Understanding the Role of Autophagy in Neurons

Elizabeth, Jansing , Andrea Holgado, Austin Bradshaw, Timothy Stein

Southwestern Oklahoma State University

Cellular autophagy or self-eating is an essential metabolic process by which cells recycle organelle's components and macromolecules. Research from animal models of Alzheimer's disease has shown that autophagy protects nerve cells from degeneration through a molecular mechanism that is not fully understood. To better understand the neuro-protective role of autophagy in the brain we began investigating LGG-1, a molecular marker of autophagy induction. Preliminary data obtained using C. elegans demonstrated that LGG-1 accumulates in cells with induced autophagy, suggesting that this protein could be used to monitor autophagy induction. Based on these studies we hypnotized that expression of LGG-1 in neurons will allow us to examine autophagy under normal and disease conditions. To test this hypothesis we began engineering a modular plasmid containing a neuronal promoter and the sequences of mCherry in frame with LGG-1. Thus far we have already obtained the mCherry sequence as well as the LGG-1. We will further continue by inserting these two sequences into the plasmids containing promoters for the expression in cholinergic and GABA-ergic neurons. Once these plasmids are produced they will be injected into C. elegans and autophagy induction will be investigated.

05.03.58 Traditional Chinese Medicine and Its Impact on Western Medicines

Ofelia, Patrick , Kevin Wang

Northeastern State University

Oriental medicine also known as traditional Chinese medicine (TCM) has been around for thousands of years. Herbology and acupuncture are different practices within Chinese medicine. This research will focus mainly on Chinese herbology and its development in Western medicine. What is herbology? Traditional Chinese herbal medicine (TCHM) includes the use of whole plants, minerals, and some animal substances to promote natural health and healing. With TCM, health is seen as a balance between the outside world and our functional entities (aging, breathing, digestion, etc.). When disease occurs, it is because there is a lack of balance between the two. Chinese herbology uses natural elements to restore the balance. Some of these medicines include herbal teas, tonics, roots & herbs, powders, and other forms of medicine. These herbal formulas are easily digested by the body and aid as natural remedies for digestion, pain, sleep, body ailments, and other health problems. The use of Chinese herbology has been incorporated into Western medicines within the last 150 years. This research will focus on different methods and practices from TCHM that have been modernized and in use in the Western world and today's society.

05.03.59 VGLL4 Functions as a New Tumor Suppressor in Lung Cancer by Negatively Regulating The YAP-TEAD Transcriptional Complex (Review)

Ahmed, Zendah

Northeastern State University

THIS IS A REVIEW OF DR.WENJING'S RESEARCH PAPER:"VGLL4 Functions as a New Tumor Suppressor in Lung Cancer by Negatively Regulating The YAP-TEAD Transcriptional Complex." Each year, people over the age of 45 have passed away because of lung cancer due to second hand smoke or by smoking cigarettes themselves. Dr. Wenjing and colleague research scientists have been working tirelessly on ways to counter the effects of cancer cells multiplying and growing in different regions of the body. Recently, scientists have found a certain protein-coding gene called VGLL4 to be a tumor suppressor gene that helps hinder the advancement of lung cancer cells by interfering with the activity of Yes-associated (YAP) oncogenes, transcriptional enhancement factors such as the TEAD gene, and the Hippo signaling pathway.

05.03.60 Determining the Effects of Narciclasine on Myofibroblast Differentiation

Madeline, Mahoney , Marko Ilikj, Melville Vaughan

University of Central Oklahoma

Myofibroblasts are cells that differentiate from fibroblasts. They are characterized by the expression of α–smooth muscle actin stress fibers. TGF-β1 can differentiate myofibroblasts from fibroblasts through the Rho-kinase pathway. Narciclasine is a plant growth modulator that was shown to be a Rho-kinase activator, as well. However, narciclasine can also induce apoptosis in cells. Our goal was to determine whether narciclasine affects myofibroblast differentiation. To test this we grew normal human fibroblasts in the presence of TGF-β1 to promote the myofibroblast phenotype, followed by narciclasine treatment. Cells were plated and stained in four groups that included a control, narciclasine only, TGF-β1 only, and TGF-β1 with narciclasine treatments. Myofibroblasts were identified by expression of alpha-smooth muscle actin deposited into cytoplasmic stress fibers. The results showed a significant increase of myofibroblasts in the narciclasine treated group, when compared to control. In addition, narciclasine did not upregulate the cells already treated with TGF-β1. These results suggest that the upregulation of Rho-kinase done by narciclasine is not significantly more than that done by TGF-β1. Studies are underway to determine whether narciclasine affects the ability of myofibroblasts to generate tension.

05.03.61 Chinese Herbology

Wyell, Okda , Kevin Wang

Northeastern State University

Wyell Okda and Dr. Yueju Kevin Wang Faculty Advisor: Dr. Yueju Kevin Wang Chinese herbal medicine is a traditional Chinese medicine that has been practiced for thousands of years and continues to make advancements despite modern scientific medicine. China currently uses over million tons of herbs yearly, with licorice being the most widely used. The use of Chinese herbal medicine is to reinstate a sense of balance within the body, spirit, and energy. There is wide spread of practice for herbal medicines. Different types of herbs or extracts can perform different treatments and prevention diseases from occurring. It is vital to understand that not all herbs possess a single quality, but have a certain mixture of properties and temperatures that can effect up to twelve organ systems. There is different ways to classifying the herbal medicine but the two most commons are in the form of nature and flavor. The four natures include cold, cool, neutral, warm, and hot. The five flavors are sweet, salty, sour, bitter, and pungent. Although herbal medicine may contain contaminants and there is modern scientific medicine that could be more efficient use of treatment; however, herbal medicine has been practiced since the beginning of mankind, typically include less side effects, and is completely all natural

05.03.62 Phylogeography of Sonoran Mud Turtles in a Fragmented Landscape

Laura, Kimmel , Michelle Haynie, Paul Stone

University of Central Oklahoma

Phylogeography is the study of the geographic distribution of genetic lineages. When well-planned and executed, phylogeographic analyses can show historical patterns of gene flow and genetic isolation. Naturally fragmented freshwater habitats often create replicated natural experiments well-suited to phylogeographic study. The often subdivided topography of individual mountain ranges in the Madrean Sky Islands make the habitat ideal for studying genetic variation of the Sonoran mud turtle at three levels: within drainages, among drainages, and among mountain ranges. Our goal is to obtain whole blood samples from 20 individuals per drainage for three discrete drainages per range for a minimum of four ranges. To date, we have sufficient samples from the Peloncillo, Galiuro, and the Huachuca Mountains, and two complete populations from the Pajarito Mountains. After DNA extraction from available samples, I amplified and sequenced 400 bp of the left domain of the mitochondrial DNA D-loop for 22 samples across three mountain ranges. Initial analysis of the sequences indicated only two probable diagnostic nucleotide differences among individuals. We have designed new primers to determine if the right domain of the D-loop will show more variation. Future research will focus on obtaining DNA sequences from all available samples as well as obtaining blood samples from the remaining population in the Pajarito Mountains.

05.03.63 Mapping AvaII and PvuII Restriction Enzymes on pUC19 is affected by Methylation

Muatasem, Ubeidat , Nick Whalen, Shasta Jones

Southwestern Oklahoma State University

Mapping restriction enzymes on plasmids is a tool used by molecular biologist to design cloning strategies and probes in addition to many other useful purposes. Theses enzymes were isolated from bacteria and named according to the source. Bacteria use these enzymes to protect itself from foreign DNA that is either injected into the cell by viruses (transduction) or acquired from the environment or from other bacteria. The bacterium that is the source of the enzyme has methylase that adds methyl groups to the restriction site to prevent the enzyme from digesting its own restriction site in the bacterial genomic DNA. Methylated restriction enzyme sites cause problems if they are not known. In our principles of biology I lab, students learn mapping of AvaII and PvuII restriction enzymes on pUC19 plasmid. They do so by digesting the plasmid with each enzyme separately and then both together (double digest). Based on the bands sizes, a map can be constructed. Over the years, pUC19 was purchased directly from New England BioLabs (NEB) without knowing if the preparation of the vector was performed in methylase negative (dam-/dcm-) or methylase positive bacteria. The double digest with both restriction enzymes showed a mixture of both a methylated and nonmethylated vector. This made the mapping very difficult to study and the map difficult for the students to construct. In our lab we are in the process of clarifying this and providing solutions for this problem.

05.03.64 Mycosporine-like Amino Acids in Oscillatoria Limnetica

Murray, Verbonitz , Ratnakar Deole

Northeastern State University

Mycosporine–like amino acids (MAA) are small molecules that contain a central cyclohexenone or cyclohexenimine ring and a wide variety of substitutions. MAAs absorb UV light that can be destructive to biological molecules like DNA, RNA, Proteins, etc. MAAs are wide spread in the microbial world and have been reported in many microorganisms including eubacteria, cyanobacteria, micro-and macro-algae, as well as some multi-cellular organisms. In the present study we investigated cyanobacterium Oscillatoria limnetica isolated from solar lakes often exposed to UV stress, for production of MAA. The cyanobacterium was found to synthesize a single MAA, mycosporine-glycine (absorption maximum at 310 nm) when isolated and purified by high-performance liquid chromatography grown under UV stress. MAA induction in presence of other stress factors such as pH, salt and temperature was also checked. The present study provides a first insight into MAA biosynthesis in genus Oscillatoriae and thus widens the field of research for molecular analysis of these evolutionary and industrially important compounds.

05.03.65 Biodegradation of an Azo dye by Citrobacter Freundii

Kj, Abraham , Chelsi Black, Nicholas Simon

Langston University

Citrobacter freundii is a human intestinal bacterium capable of breaking down azo dyes. Azo dyes are generally considered to be compounds that are synthesized or of natural origin. Lot of attention on this field is towards microorganisms from the human intestine that are involved in the metabolism of azo dyes ingested as food additives. Hundreds of these dyes and their degradation products are carcinogenic in nature. They not only get into our bodies via water, but also through inhaling and ingestion of food. The aim of this research was to study biodegradation of a reactive dye, direct blue 15 by C. freundii. The hypothesis is that C. freundii will be able to decolorize and degrade the azo dye into one or more compounds. Varying concentrations of the substrate, the direct blue15 were used for enzyme assay. Results demonstrated decolorization of the dye by the bacterium. Future studies will focus on the analysis of the compounds and characterization of the enzyme involved in biodegradation.

05.03.66 Generating Caenorhabditis elegans UNC-33 Antigens to be Used for the Synthesis of Polyclonal Antibodies

Mason, Howe , Andrea Holgado, Jacob Fuller, Matthew AbbottMichael Caniglia

Southwestern Oklahoma State University

UNC-33, the C. elegans homolog of the collapsin response mediator protein-2 (CRMP2), has been demonstrated to be involved in neurodegenerative disorders, primarily Alzheimer’s Disease. However, the physiology and interactions of these associations are vague. In order to further understand UNC-33, our group decided to use molecular biology and work toward the production of polyclonal antibodies specific to UNC-33. To do this, we first produced plasmids by incorporating the nucleotide sequences for the UNC-33 into the GST tag Gene Fusion System. Next, we began with the production of two antigens UNC-33 amino acid 48 to 212 and UNC-33 amino acid 48 to131 (UNC-3348-212 and UNC-3348-131). During this process, we developed the parameters of an efficient protocol for the expression and purification of these polypeptides. Once we established an effective protocol, we performed numerous batches of expression and purification, and tested the purity of GST fused UNC-3348-212 and UNC-3348-131. Overall, these procedures resulted in the production of 1.24 mg/mL and 0.84 mg/mL of GST fused to UNC-3348-212 and GST fused to UNC-3348-131, respectively. Currently, these purified polypeptides are being injected into laboratory animals for the generation of polyclonal antibodies for two of the three UNC-33 isoforms. To complete our molecular toolkit, we are producing a third UNC-33 antigen that will detect all three UNC-33 isoforms furthering the knowledge of the UNC-33 protein family.

05.03.67 Minimum Tensional Requirement for Proliferative Myofibroblasts

Julie, Hamilton

University of Central Oklahoma

This study continues research development in the proliferation of myofibroblasts. Fibroblasts are extensively important in the area of wound healing, and found prevalently in connective tissue. Fibroblasts are able to differentiate into myofibroblasts, which are more highly contractive than their predecessors. Their growth and contracture strength are heavily dependent on tension generation, therefor this study aims to find the approximate minimum amount of tension required for successful myofibroblast proliferation of DP147htert cells in a stress-released collagen matrix. This will be done by setting DP147htert cells in a collagen matrix and allowing separated lengths of growth to occur. Upon each respective time lapse I will sample the matrices, stain and photograph them using an immunofluorescence microscope. I will be able to determine when minimal tension was achieved by pin-pointing the time frame in which the proliferation of regular fibroblasts into their brighter, stress-fiber containing counterparts, myofibroblasts. I expect to find that proliferation occurs approximately 3-4 days into tension generation. Through studying these proliferative effects of fibroblasts and myofibroblasts, a better understanding of their unique properties and life cycles will be gained, leading to opportunities to potentially study would healing in the most molecular of levels.

05.03.68 Review: Rice-Based Oral Antibody Fragment Prophylaxis and Therapy Against Rotavirus Infection

Ricky, Yang

Northeastern State University

Rotavirus is the leading cause of diarrhea in infants and young children worldwide, mainly in developing countries. I reviewed this study by (Dr. Tokuhara et al., 2013) in which a transgenic rice-based, orally administered product against rotavirus is created by producing rice expressing an antibody fragment, ARP1 (MucoRice-ARP1). MucoRice-ARP1 rice powder or rice water offer a novel approach to the prevention and treatment of rotavirus-induced diarrhea, which could reduce the medical and economic burden in both develop and undeveloped countries. To test this, mice were used as test subjects. Orally administered MucoRice-ARP1 greatly decreased the viral load in immunocompetent and immunodeficient mice. Heat treated MucoRice-ARP1 at 94°C for 30 minutes, used prophylactically significantly reduced the percentage of animals with diarrhea on day 2 of the experiment. Long-term stored MucoRice-ARP1 applied prophylactically also significantly reduced the incidence of diarrhea and disease severity. In this experiment (Dr. Tokuhara et al., 2013) showed MucoRice-ARP1 to successfully prevent and treat RV-induced diarrhea.

05.03.69 The Role of CRMP in Proper Synapse Formation in Drosophila

Caleb, Hubbard

Other

Proper synapse formation is essential to the development of a functional nervous system. Numerous genes regulate each step of this process, from axonal specification and elongation to the location of the correct neuronal partners. Collapsin response mediator protein (CRMP) is a phosphoprotein known to regulate several aspects of neuronal development and synaptogenesis. CRMP has been associated with several pathological disorders and neurological diseases. However, the specific mechanisms of this protein have yet to be fully elucidated. In the model organism Drosophila, a prior genetic screen has identified CRMP as necessary for proper development of the R7 photoreceptors. The screen revealed that the R7 photoreceptors in the retina of crmp mutants do not form a synapse in the correct layer of the medulla. This suggested that the crmp gene may be required for normal neuronal development. If this is true, we would expect mutants to display phenotypes in the neuronal physiological function and in the morphology of synapse formation. We tested this prediction with two approaches: To test the functionality of these mutant photoreceptors we conducted electroretinograms (ERG's) in adult Drosophila. To examine synapse morphology, we tested whether the numbers of synaptic boutons along the neuromuscular junction differ in the mutant phenotype in Drosophila larvae compared to wild type. We found phenotypic differences in both electrophysiological function and developmental mor

05.03.70 High Success Of Subordinate Male Social Tactics And Female Promiscuity Promote Sexual Conflict In Collared Lizards

Joshua, York , Michelle Haynie, Troy Baird

University of Central Oklahoma

I tested the extent to which mating relationships among collared lizards were driven by intrasexual competition among males displaying territorial and non-territorial social tactics, or adaptive mating choices by females over three seasons when local sex ratios (LSR) varied markedly. Surprisingly, neither the distribution of reproductive success, nor mating success among males, varied with LSR. Territorial and non-territorial males achieved similar mating success and reproductive success in all three years. Although females were equally promiscuous with a similar number of territorial and non-territorial males in all three seasons, promiscuity decreased offspring survivorship. Because females do not appear to have any adaptations that balance these costs, this suggests that females are 'making the best of a bad job' by accepting unwanted copulations. The cause of sexual conflict and the high success of non-territorial males may be linked to the homogenous, continuous topography of the human-constructed habitat at our study site, which differs substantially with that of the natural habitat of collared lizards.

05.03.71 Ampicillin Resistant Bacteria From Waste Water Treatment Plant

Eric, Paul , Cody Moulton

Southwestern Oklahoma State University

The occurrence of antibiotics in the environment has become a public concern. Recent environmental monitoring activities reveal the presence of a broad range of pharmaceuticals in soil and water. The emergence of bacteria resistant to antibiotics is common not only in areas where antibiotics are used, but are increasingly occurring in aquatic environments. Studies show that municipal waste-water treatment plants (WWTPs) are important point sources of antibiotics and antibiotic-resistant bacteria in the environment. The main objective of this work was to study the antibiotic resistant bacteria in raw and treated waste-water from a local municipal waste-water treatment plant (WWTP) that receives domestic and pretreated industrial effluents in Weatherford, OK. Raw and effluent water from the treatment plant were used to isolate Ampicillin resistant bacteria. A Gram positive and a Gram negative isolate were identified. The isolates were tested against various other antibiotics using the disk diffusion method and found to be resistant to multiple antibiotics. Each of the isolates did harbor a plasmid and the plasmids were of a different molecular weights. The plasmids are being characterized.

05.03.72 Orientation of Burrows in Cynomys ludovicianus

Matthew, Bryson , Chris Butler, William Caire

University of Central Oklahoma

The black-tailed prairie dog (Cynomys ludovicianus) is native to the Great Plains of North America. A social animal, C. ludovicanus lives in towns which provide protection against predators by combined surveillance. The purpose of the study was to determine whether the openings to the burrows at the perimeter of the town were oriented away from the center, which would facilitate detection of predators. Oklahoma study sites were located at Elmer Graham Toll Plaza near Lawton and Beaver River Wildlife Management Area, and were visited from 19-20 October and 15-17 November, 2013 respectively. Locations of burrows were plotted using GPS. Magnetic azimuths of the burrow openings were taken with a lensatic compass. Data were plotted using QGIS to create a map of the burrows in the town and vectors for perimeter burrows were created from a derived centroid. The deviation of the azimuth from each vector was calculated, categorized into 12 groups, and analyzed by a $\chi 2$ test. The orientations of burrows at the perimeter of the colony were randomly distributed. This is in line with previous studies suggesting that prairie dog burrows are used for ventilation.

05.03.73 Response of Chlamydomonas reinhardtii to Medium Viscosity

Thi, Nguyen , Gang Xu, Huong Do, Steven Karpowicz

University of Central Oklahoma

The single cellular alga Chlamydomonas reinhardtii is a model organism involved in many research areas of biology, especially cilia structure and function. Its locomotion is provided by its cilia. Cells of this species can grow on a simple medium of inorganic salts, using the molecule acetate as well as photosynthesis as sources of carbon and energy. The objective of this study is to determine whether physical forces experienced by the cell affect gene expression, and whether gene expression influences cilia behavior. Specifically, we are determining whether different medium viscosities will affect cilia function and influence gene expression. We tested if medium viscosity affected growth rate, but the results indicated no significant difference. However, cells do show a 7-fold decreased velocity in more viscous growth medium. RNA isolation is being performed and will be followed by RNA sequencing to determine gene expression patterns in cells grown in the different medium viscosities.

05.03.74 Scientists Easing Concerns about Genetically Modified Food by Removal of the Selectable Marker

Alexia, Dickey , Kevin Wang

Northeastern State University

Transgenic plants, (commonly known as genetically modified organisms) are useful for a variety of reasons: creating healthier crops, increasing the number of crops we are capable of producing, and cheaply mass-producing medications. The transgenic plants are created by giving a plant a desirable trait that it otherwise would not have. A selectable marker is then used to ensure the gene of interest has been successfully inserted into the plant's genome and then isolated. The selectable marker is an antibiotic or herbicide resistance gene that tags along with the gene of interest on a vector which inserts itself into the genome of some of the plant's cells. The antibiotic kills off all the cells that have not been transformed. Horizontal gene transfer between plants and microorganisms is a big concern among consumers. If the antibiotic resistance gene is transferred to bacteria, then the bacteria would become resistant to the antibiotic also; this contributes to the growing problem of antibiotic resistance among bacteria. One way of suppressing some of the controversy associated with genetically modified organisms is by eliminating the selectable marker through microbial site specific recombinases. An enzyme would literally cut out the marker after the plant has been transformed, eliminating the antibiotic resistance gene while leaving the desired trait intact.

05.03.75 Plankton Survey of Tulsa Botanic Garden Lake

Patty, Smith , Dalia Acosta

Tulsa Community College

Plankton samples were obtained from the Tulsa Botanic Garden lake through the months of September, October, and November of 2013. The Garden is located on 160 acres of pristine Cross Timbers and prairie ecoregions. This site provides a unique opportunity to survey plankton samples and understand plankton succession in a recently man-made lake. The plankton samples were examined for both phytoplankton and zooplankton identification.

05.03.76 Molecular Cloning and Protein Expression of a Heart Disease-Indicator Protein

Eun Kyung, Shin , Mohammad Hossan, Steven Karpowicz

University of Central Oklahoma

The protein cardiac troponin I (cTnI) is expressed exclusively in heart tissue and is important to heart muscle relaxation. Typically, the concentration of cTnI in the blood is negligible and cannot readily be detected, but cTnI concentration can increase to 0.08 ng/ml during cardiac cell death, such as occurs before and during cardiac arrest. To improve diagnostic tests for this heart-health indicator protein, we are interested to express cTnI and demonstrate that microfluidics can be used to concentrate the protein to a detectable level. Here, we describe our ongoing project of molecular cloning of the cTnI gene into an expression plasmid, transformation of E. coli with the plasmid, and expression and isolation of cardiac troponin I.

05.03.77 Chemical Composition of Femoral Gland Secretions in Male Collared Lizards

Abigail, McGee , F.N. Albahadily, John Bowen, Thomas JourdanTroy Baird, Wayne Lord

University of Central Oklahoma

Chemical signals, in the form of femoral gland secretions, are used by lizards having well-developed chemoreception (e.g. Scleroglossans; Teidae, Scincidae) to communicate intraspecifically. Although they have highly developed visual signaling, male collared lizards (Crotaphytus collaris) also produce secretions from femoral glands, and periodically sample these secretions by licking the substrate, which suggests chemical signaling as well. We analyzed the femoral gland secretions of male collared lizards (N=6) using gas chromatography-mass spectrometry. Results suggest compounds that are also found in the femoral secretions of C. collaris are similar to compounds in the secretions of a congener, C. bicintores, as well as those of some scleroglossan lizards. Six of these compounds are similar to those identified in femoral gland secretions of C. bicintores, and one of them is the compound that has been identified in scleroglossans as a signal of RHP. Future research will examine this possibility by comparing the levels of hexadecanol in territorial versus non-territorial collared lizard males.

05.03.78 Review of Traditional Chinese Medicine versus Western Culture Drugs in the Treatment of Alzheimer's Disease

Kelsey, Perry , Kevin Wang

Northeastern State University

Alzheimer's disease is characterized by progressive loss of memory and cognitive ability. While there is no known cure for Alzheimer's disease, drug development over the past several years has yielded medications with the ability to slow the progression of the disease. Traditional Chinese medicine has been used in the treatment of many diseases for thousands of years. Recent studies of the acetylcholinesterase inhibiting abilities of some of these ancient herbs have shown promising results for the treatment of Alzheimer's disease. In a review of clinical trials of traditional Chinese medicine and clinical trials of pure drug medicines of the Western culture, traditional Chinese medicines showed greater acetylcholinesterase inhibitory effect as well as fewer side effects. Results of these studies may prove to be the gateway to integrating traditional Chinese medicine into the treatment of Alzheimer's disease and possibly other cognitive diseases.

05.03.79 Bioinformatics Of Dihydropyrimidinase–Related Protein 2 In Schizophrenia

Amber, German , Sharon Lewis

Langston University

Introduction: Schizophrenia is a mental illness is characterized by a breakdown of thought processes and poor emotional responsiveness. Contrary to what many believe, schizophrenia does not imply a "split personality," or "multiple personality disorder." Rather, the term means a splitting of mental functions. Common symptoms include auditory hallucinations, paranoid or bizarre delusions, and disorganized speech and thinking. As a result, people suffering with schizophrenia have significant social or occupational dysfunction. OBJECTIVES: Identify the gene mutation in drp-2, since it has been implicated in susceptibility to schizophrenia. METHODS: We visited approximately fifteen databases and generated a bioinformatics workflow to investigate drp-2. Anticipated Implications: My aim is to display the actual gene mutation along the T-Coffee Multiple Sequence Analysis. To complete this project, we must collaborate with a comprehensive university that has the resources to generate drp-2 knock-out mice to produce biomarkers.

05.03.80 Review of Plant Pharming of a Full-sized, Tumour-targeting Antibody Using Different Expression Strategies

Shaman, Kidd

Northeastern State University

The goal of the work from authors Maria Elena Villani, et al. was trying to obtain a human antibody against an antigen called tenascin-C (TNC), associated with tumors, and to compare two systems for purifying antibodies based on the quantity of antibody they produce and the quality of the antibodies. To do this, the human gene for immunoglobulin G antibody (H10) is engineered so it can be expressed in plants. Using an affinity-purification process on Nicotiana tabacum, it was found to produce 0.6-1.1 mg/kg of the antibody. H10 was then purified from Nicotania benthamiana using a process called the Agrobacterium-mediated gene-transfer system. With this process, a gene called the p19 silencing suppressor gene was taken from the artichoke mottled crinkle virus and used in the purification process. This process yielded a much higher 50-100 mg/kg of H10, and produced antibodies that were shown to be full-sized antibodies that bound to TNC at a rate of 75%, and also accumulated around the blood vessels of tumors. From the data, the H10 purification process from the Nicotania benthamiana was shown to have a higher yield of functional antibodies, which when used in conjunction with the p19 silencing suppressor gene, can lead to a quick, inexpensive way of reproducing H10 using plant pharming. Paper from Plant pharming of a full-sized, tumour-targeting antibody using different expression strategies published in the Plant Biotechnology Journal (2009) 7 pp 59-72

05.03.81 Expression of an Endogenous, Motorless Transcript of Myosin V

Stephen, Fields , Desiree' Lyon

East Central University

The Caenorhabditis elegans hum-2 gene is a class V myosin with three predicted alternatively spliced transcripts. The 5.4 kb hum-2A and B transcripts consist of 17 exons spanning 12.8 kb of genomic DNA to give predicted 207 kD products with strong homology to all of the motifs present in mammalian myosin Va. The hum-2C transcript is of particular interest because it would yield a truncated product consisting of a cargo-binding tail but no motor domain. Other than the presence of the myosin V-specific carboxy-terminal DIL motif, there are no other features that would suggest specific functions for the truncated HUM-2 protein. The purpose of this investigation is to localize and quantitate expression of the unique hum-2C transcript. Transcriptional fusions of an internal hum-2C internal promoter with GFP indicate that this transcript is more widespread than the full length transcripts and that it is concentrated in the neurons. A translational fusion of the HUM-2C protein to GFP shows the protein to be localized to particles moving down neuronal axons. Real-time PCR with primers common to all three hum-2 transcripts indicate constitutive expression during different nutritional stages of the lifecycle. We are using primers specific for the unique first exon of hum-2C to track expression of hum-2C under different growth conditions and in different genetic backgrounds. We are also performing bioinformatic analyses to identify similar truncated transcripts in mammalian systems.

05.03.82 Does Habitat Geometry Influence the Social Behavior of Male Collared Lizards?

Cody, Braun , Troy Baird

University of Central Oklahoma

Theory predicts that the economics of territory defense should be influenced by variation in the spatial distribution of resources critical for survival and reproduction. Because size and geometry of habitat patches necessarily dictate the configuration of resources, they are expected to influence the cumulative costs relative to the benefits of defense. Territorial male collared lizards should establish territories that promote access to females while minimizing defense costs. Where habitat patches are larger and variable in shape, defense costs may be increased because males must travel further to confront and repel rivals and court females. By contrast, both potential mates and rivals are likely more concentrated on compressed habitat patches. Such a distribution may mandate increased advertisement to rivals, but may also decrease travel costs of defense. Under this hypothesis, males should be able to invest more time and energy courting females. We used quantitative field observations to test the influence of habitat geometry on the behavior of territorial males. Males defending territories on compressed habitat patches courted more different females, more frequently than males defending territories on more expansive patches. By contrast, frequencies of broadcast display and encounters with rival males did not differ. Male occupants of compressed habitat patches probably incur lower costs of patrol, and they appear to invest the extra time and energy in courting females.

05.03.83 Examining the Relationship between Pollinator Size and Nectar Standing Crop Levels in Invasive Plant Populations in Greece and the USA

John, Barthell , H. Wells, JeAnna Redd, John HranitzT. Petanidou, Victor Gonzalez Betancourt

University of Central Oklahoma

Pollinators can be attracted to flowering plant species according to a number of variable rewards. Due to endogenous (e.g., morphology) and exogenous (e.g., competition) constraints, variables such as body size and shape within and among species can correlate with plant reward characteristics. We examined the relationship between body size of bee pollinators visiting plots of the invasive plant species Centaurea solstitialis L. and the nectar standing crop levels recorded in those same plots. Our findings show significant differences in average bee body size (estimated with head capsule width) according to average nectar standing crop levels. As a general rule, large-bodied bees visited plots with relatively high standing crops more often than did small-bodied bees. This finding is consistent within and between the island ecosystems where the study occurred, including Lesvos (Greece) and Santa Cruz Island (USA). The results are also discussed in the context of pollinator guild composition and the taxonomic and biological characteristics of bee species visiting C. solstitialis.

05.03.84 Using Optogenetics to Study Exocytosis in C. Elegans Motor Neurons

Wil, Markus , Andrea Holgado, Elizabeth St.John

Southwestern Oklahoma State University

Synaptic vesicle exocytosis is a process in which neurotransmitters are released from vesicles in a presynaptic terminal into the synaptic cleft. Fusion of the filled vesicles is made possible by SNARE proteins. The vesicular SNARE protein synaptobrevin interacts with the target membrane SNARE proteins, syntaxin and SNAP-25, creating a SNARE complex, commencing vesicle fusion. Neurotransmitters like GABA and ACh are conserved in the motor-nervous system of humans to C. elegans. Thus, understanding their release properties and regulation is crucial for motor function knowledge in normal conditions and pathological disorders. Utilizing the model organism C. elegans, we propose to study the rate of synaptic vesicle exocytosis via optogenetics, as well ascertain their regulatory mechanisms. To do so, a plasmid was created that includes a region of genes that will express a pH sensitive, red fluorescent protein called pH Tomato, as well as regulatory sequences that drive expression in cholinergic or GABAergic neurons. The plasmid also contains sequences coding for the amino terminus and transmembrane domain of synaptobrevin, a synaptic vesicle resident protein that targets the fused pH Tomato to exocytic vesicles. Currently, the modular plasmid has been made and sequenced. Future plans include microinjecting the plasmid into our model organism, and monitoring the rate of vesicle fusion in both wild type and mutant animals that could have deficiencies in their rate of exocytosis.

05.03.85 Using Transgenic Plants to Produce Blood Clot-Dissolving Proteins

Lauren, Tull , Kevin Wang

Northeastern State University

Introduction: Lumbrokinase (LK), in earthworms, and Nattokinase (NK), in Bacillus subtilis, can dissolve fibrin clots without causing excessive bleeding. Our goal was to clone LK and NK, transiently and stably express the proteins in tobacco and prove the recombinant proteins retain anti-thrombolytic activity. Methods: Genscript Co synthesized codon-optimized and wild-type gene fragment of LK (PI293) and NK (GenBank: AF368283.1). The DNAs were isolated and inserted into a vector, pBYR2fp, for transient expression and pCambia2300-Phas1470-Nos, for stable transformation and expression. Fibrin dissolving assay tested gene expression and function of the transient expression vector. Results: We optimized LK and NK gene codon for tobacco codon usage bias. Codon-optimized and wild-type genes shared different nucleic acids; the primary protein sequence is identical. Codon adaptation index (CAI) of LK and NK increased and GC content decreased allowing for higher expression of foreign protein. Eight vectors for transient expression and stable transformation were made and checked by restriction reactions. Transient expression vectors tested positive for gene expression and function with fibrin dissolving assay. Conclusions: Expression vectors of LK and NK for transient and stable plant transformation were made. Transient expression vectors were expressed and tested positive for clot dissolving function. Next we will test gene expression and function of the stable expression vectors.

05.03.86 Bee Pollinator Visitation at Two Color Morphs of Chasteberry Bushes on the Greek Island of Lesvos

John, Barthell , Brianna Levinson, C. J. Pascual, Corey BowerLauren Blatzheim, S. Burrows, T. PetanidouTrimelle Polk, V.H. Gonzalez Betancourt

University of Central Oklahoma

The Mediterranean plant species Vitex agnus-castus, also referred to as Chasteberry, or locally as Texas Lilac, has inflorescence colors ranging from white to blue or purple depending upon the individual plant. We studied pollinator (bee) visitation rates at relatively uniformly-colored bushes of either white or blue flowering forms of V. agnus-castus. Both bee visitation rates and the peak visitation times differed in a variable manner between the two morphs but the overall number of pollinator species did not significantly differ between them; nectar quality and volume of the blue and white inflorescences were also recorded and are compared with these findings. The lack of significant differences in pollinator visitation rates and their rewards at bushes of V. agnus-castus suggests that these flower colors may not matter to foraging bees and is consistent with findings in other studies that examine bees foraging at artificial flowers. In addition, however, these morphological differences, coupled with nectar flow and quality dynamics, may reveal a mechanism for ensuring outcrossing potential for the plant.

05.03.87 Biotechnology of Plants and Pharmaceuticals

Mohammed, Shaban , Kevin Wang

Northeastern State University

Biotechnology has become a lot more popular in the present day. It has become a field of study that more people are looking into and learning new material about. What is Biotechnology? The term biotechnology means to use living organisms or their products to assist in the industry of either, agriculture or pharmacy. In my paper, I will focus on plant biotechnology and pharmaceutical biotechnology. I will also focus mainly on antisense gene technology for both, agricultural and pharmaceutical reasons. The population is increasing at an incredible rate, which means the demand for food is also growing. As a result of the increased demand for food, we need to increase crop production. In order for crop production to keep up with the population growth, plant biotechnology must step in. Plant biotechnology encompasses the manipulation of the plant genome to make the plant or products more useful. Plant biotechnologists, people that work in the field of plant biotechnology, use plant transgenesis. Plant transgenesis means to transfer genes directly to plants. Plant transgenesis has many different methods, including conventional selective breeding and hybridization, cloning, protoplast fusion, gene guns, and antisense gene technology.

05.03.88 Molecular Farming: Using Transgenic Plants in the Production of Human Recombinant Proteins

Lyndsey, Weeks , Kevin Wang

Northeastern State University

The molecular farming of plants is emerging as a valuable field in the synthesis of biopharmaceuticals for the treatment of immunological diseases worldwide. Using a plant-based platform, such as tobacco, to produce recombinant proteins can lower the production costs of pharmaceuticals, making medicine readily available for use in third world countries. Molecular farming couples the principles of DNA recombination and plant transformation to generate a safe and effective approach to treating disease and there has been success in the production of recombinant proteins found in blood plasma such as serum albumin, antibodies, and cytokines. Genetically modified plants (GMP's) can be used as a safe and effective alternative in the synthesis of biopharmaceuticals and recombinant proteins. Despite the advances in molecular farming, there are many upcoming challenges and obstacles that will be reviewed.

05.03.89 Review on Bacteria

Shafiq, Al-Rifai , Kevin Wang

Northeastern State University

Living a lifestyle filled with eating nutritiously and exercising profusely is vital for ensuring a strong and healthy body. However, in order to fully understand healthiness, one must study and read on potential pathogenic microbes. Furthermore, I have read many peer reviewed articles on different bacteria, ranging from microflora to strictly pathogenic bacteria. For example, Staphylococcus aureus is a bacterium that lives on and in our body normally. However, if one were to get a cut, Staphylococcus aureus could infect the cut and cause a skin infection. If not treated, Staphylococcus aureus could seep into the blood and cause bacteremia, which would then cause concerning complications. Moreover, an example of a strictly pathogenic bacterium is Salmonella enteritidis, a bacterium which causes food poisoning. It is very important to be informed on these microscopic organisms; therefore, I have made a review of different articles to share a broad amount of information on the bacteria that could change a life forever. In this review of other peer-reviewed articles, I will discuss the different types, but most common bacteria that can cause disease, I will give a method of treatment for different bacteria, and I will examine different types of antibiotics available. It is not only important to understand bacteria for yourself, but it is also important to understand bacteria for the people around you.

05.03.90 Analysis of Marine Derived Fungal Siderophores by LC-MS

Monica, Stalls , Jessica Martin

Northeastern State University

Iron limitation is a major factor influencing the growth of microorganisms, from infection of a mammalian host (where iron is tightly controlled by protein complexation) to aquatic and marine environments (where iron is not soluble or is complexed by organic ligands). Many microorganisms produce low-molecular-weight, iron(III)-specific chelators called siderophores to compete for iron. The objectives of this project are to identify novel siderophores produced by different marine-derived fungi strains and to evaluate them for use as antimicrobial or antineoplastic agents. Marine fungal strains were evaluated for siderophore production using an iron-dye containing agar. Siderophore-producing strains were cultured in artificial seawater broth, the iron-binding compounds were isolated by RP-HPLC, and the purified compounds were analyzed by mass spectrometry. In this study, 8 out of 11 novel strains evaluated have produced siderophores, and so far the siderophores from three of these strains have been positively identified; the remaining strains are under investigation. Two strains of the genus Leucosporidium were found to produce the siderophore ferrichrome, and a strain of Rhodotorula mucilaginosa (ATCC 201848) was found to produce rhodotorulic acid. We report here recent evaluation of new marine fungal strains by LC-MS.

05.03.91 Agoutis on the Alert!

Sharonda, Carson , Enzo Aliaga-Rossel

University of Central Oklahoma

The expression of anti-predation behavior can be the difference between life and death. The signs of anti-predation behavior can be expressed by auditory, vision, tactile, and olfactory cues. Agoutis (Dasyprocta punctata) for an example are mammals that use auditory cues to avoid predation. These mammals are a key component to the Neotropical forest as seed dispersals, seed predators, and prey for several species. They spend the day defending their territory from invading agoutis, searching for food, looking for potential mates, and watching for predators. The objective of the research was to study the alert behavior of agoutis in two different habitats at the Las Cruces Biological Station located in Las Cruces, Costa Rica. A group of agoutis from the artificial Wilson botanical garden and from the secondary forest were studied to see which group would express more signs of anti-predation behavior. One group has grown accustom to the presence of humans and hearing everyday disturbances while the other group has not grown accustom to the presence of humans and hearing everyday disturbances. When observing the response of agoutis hearing the sound of a predator, test calls from an ocelot were played. The calls were played at about fifteen to twenty meters away and were played at an increasing distance the longer it took the agoutis to respond.

05.03.92 Precipitation Effects on Tree Ring Width for Ulmus Americana L. in Oklahoma City

Carmen, Cowo , Chad King, Chris Butler

University of Central Oklahoma

Low precipitation affects the size of annual growth rings in trees. American elm (Ulmus americana L.) has little literature published on its response to low precipitation. Cores from twenty American elm trees were obtained from a forested region in northern Oklahoma City. Tree ring widths for 2008- 2013 were compared to annual precipitation rates of northern Oklahoma City for the corresponding years. Results using a one- way ANOVA revealed a significant difference in tree ring widths by year ($F_{5, 114} = 2.950$, $p = 0.015$). Tukey's HSD post hoc tests showed a significant difference in tree ring growth (mm) for years 2011 (2.12± 1.05860 mm min, $p = 0.010$) and 2013 (3.94± 2.42756 mm min, $p = 0.010$). Calculation of a Spearman rank- order correlation coefficient indicated a significant positive relationship between annual rainfall in northern Oklahoma City and American elm tree ring width ($p = 0.039$). Knowing the effects of drought can help predict future responses of trees to changes in precipitation. Predicting responses of species to microclimatic changes can help researchers plan and implement future conservation efforts.

05.03.93 Results Not Typical: A Review of Obesity Science, Mythos, and Media

Rose, Welch

Cameron University

The objective of my research was to explore current scientific research regarding obesity and its impact on our national health and medical spending. This topic interested me because anyone who takes part in any type of media consumption is constantly blasted with the idea that an obesity epidemic is gripping our nation, presumably with fat fingers coated in French fry grease. This conventional wisdom would have is believe that each year without a solution to our crisis of weight brings with it almost a million American deaths and the advent of chronic diseases that cost our country over a hundred billion dollars in medical costs. But despite these entrenched ideas surrounding obesity in both our conventional and common medical wisdom, how solid is the science behind this idea? Are the fatties really squashing our national health and budget? Research scientists have been addressing this issue for over fifty years, and as one might expect, the data is clear: Obesity, as defined by body mass index, is not a cause for concern. After an extensive literature review, I was able to conclude that most 'common knowledge' regarding these topics was grossly inaccurate; surprisingly, this included information by some leading health experts. Further, my research indicated that the cause of this misinformation seems to be the media presentation of weight science, in an effort to sell the American public an imaginary disease and cure.

05.03.94 Necrophagous Honeybees: Evolutionary Conservation of Predatory Foraging Behavior

JeAnna, Redd , John Barthell, Thomas Jourdan, Wayne Lord

University of Central Oklahoma

Honeybees (Apis mellifera) have a remarkable sense of olfaction and are direct descendants of wasps. Wasps are predatory insects whose diets consist of other insects and carrion. This study sought to determine whether or not the odor detectors in honeybees can be redirected from floral attractants to carrion. Four chemicals present in carrion were used in varying combinations to simulate carrion. For each odor, bees were trained by exposure to the scent paired with a sucrose solution in the mouth of the hive for one to two days prior to experimentation. Three feeding stations were set equidistant from the hives and each other. Each of the feeders consisted of a 1.5M sucrose solution and scent was added to the third feeder. The number of bees feeding at each station was tallied in 20 minute intervals. Upon conclusion of the timed trials, the stations were moved to the next location. This was repeated until the scented station had been in each feeding location. Each trial was repeated at 25m and 50m. A final trial was conducted using actual carrion in place of the carrion scented sucrose solution. For all odors and combinations, the bees showed a trend of preferentially visiting the feeder containing the scent with which they were trained. They also showed interest in actual carrion in the final trial. The findings of this study indicate the ability of the honeybee to revert to the ancestral characteristics of the wasps by seeking out the feeders with carrion odor.

05.03.95 Antimicrobial Plant Proteins

Tahzeeba, Frisby , Dennis Frisby, Elizabeth Carter

Cameron University

Pests and pathogens have typically been controlled through the application of chemical pesticides but resistance to antimicrobial products is increasing in alarming numbers. Also, the use of chemical pesticides is under attack because of economic, environmental and health issues making it necessary to find alternate strategies for more effective solutions. Naturally occurring pesticidal compounds are synthesized by the plant defense system which include antimicrobial proteins and lower molecular weight natural products. Once an antimicrobial activity is discovered, one can identify and sequence the gene product, i.e. an antimicrobial protein, and use this information to isolate the gene or use approaches to directly clone the gene. These isolated genes can then be introduced into plants via various techniques of plant transformation to increase resistance to pathogens. The long term focus of our research is to find alternative ways to protect crop plants from fungal and bacterial pathogens and to discover antimicrobial compounds for potential use in human and veterinary medicine. The specific goal of the present research project is to discover, isolate and characterize antimicrobial proteins from plants. Plant species were collected locally and screened for antimicrobial activity. Antifungal activity was discovered in two plant species and partially purified from one. Our current data indicates that activity is due to protein and not polypeptide such as defensins.

05.03.96 Optimizing Protocols for Measurement of Ion Leakage and Chlorophyll Content in Dark Stressed Plants.

Gnanambal, Naidoo , Allan Eastham, Eugene Deloach

Langston University

Abiotic stress adversely affects plant growth. Determining membrane permeability as a result of environmental stresses, growth and development, and genotypic difference is accomplished by measuring solute leakage from plant tissue. We hypothesized that greater leakage would occur with increased light depravation. We planted Arabidopsis thaliana : wild type and Lox 4 mutants. After growing plants for three weeks, some flats were placed in the dark. We measured the ion leakage at zero hours, six hours, and 24 hours post darkness. Similar sized leaves or rosettes were rinsed with deionized water, and immersed in 25 mL of deionized water for 4 h with shaking at 100 rpm. The conductivity of the solution was measuredwith an Oakton CON 510 Series conductivity meter. Theses samples were then autoclaved, and conductivity was measured again. Relative ion leakage of the autoclaved was calculated. We repeated these steps for each time period and obtained two measurements for each. Chlorophyll isolations and measurements of samples subject to the same conditions (including sampling time) were also carried out. We discuss the effects of light stress on ion leakage and chlorophyll content in wildtype and Lox4 mutants.

05.03.97 Neural Circuits of Disgust Induced By Sexual Stimuli in Homosexual and Heterosexual Men: An fMRI Study

Zinar, Simsek

Northeastern State University

Researches have demonstrated neural circuits related to disgust influenced by internal sexual orientation in male. Scientists used (fMRI) technique to study the neural responses to disgust in homosexual and heterosexual men to investigate that issue. 16 homosexual and 16 heterosexual total of 32 healthy male volunteers were scanned while viewing alternating blocks of three types of erotic film: heterosexual couples (F–M), male homosexual couples (M–M), and female homosexual couples (F–F) engaged in sexual activity. All the participants rated their level of disgust and sexual arousal as well. The F–F and M–M stimuli persuaded disgust in homosexual and heterosexual men, respectively. The common motivations related to disgusting stimuli included: bilateral frontal gyrus and occipital gyrus, right middle temporal gyrus, left superior temporal gyrus, right cerebellum, and right thalamus. Homosexual men had greater neural answers in the left medial frontal gyrus than did heterosexual men to the sexual disgusting stimuli; however, heterosexual men exposed significantly greater activation than homosexual men in the left cuneus. ROI analysis showed that negative correlation were found between the magnitude of MRI signals in the left medial frontal gyrus and scores of disgust in homosexual subjects ($p < 0.05$). This research showed that there were regions in specific as well as in common for each type of erotic stimuli throughout disgust of homosexual an

05.03.98 Different Durations of Electroacupuncture Stimulations and Its Effect on Skin Blood Flow and Muscle Blood Volume

Mahmood, Khattab , Kevin Wang

Northeastern State University

The objective of this research is to determine whether or not the duration of electroacupuncture stimulations causes a different response for skin blood flow as well as muscle blood volume. The authors did not state their hypothesis so my own hypothesis is that the longer the duration of the stimulation the more increase in skin blood flow as well as muscle blood volume and vice versa. An increased amount stimulation time will correlate to an increase on the skin blood flow and muscle blood volume. A lower amount of stimulation time will show a decrease on the skin blood flow and muscle blood volume. To test the hypothesis, a couple of experiments were tested. In the first experiment, healthy male students were divided into two groups that consisted of an electroacupuncture group and a no-stimulation group. In the second experiment, the male students were divided into three groups each with different durations of stimulation. The results of the first experiment showed a difference between the two groups. In the electroacupuncture stimulation group, we saw an increase in muscle blood volume instantly as well as at all durations. No change was observed, however, for the no-stimulation group. For the second experiment, results showed no difference between the groups. The muscle blood volume increased at all three stimulation times. The skin blood flow saw an increase following stimulation at 5 and 10 minutes, respectively. Author's Names: Mori H, Kuge H, Tanaka TH, Taniwaki E.

05.03.99 The Climate Change Conundrum of the Lesser Prairie-Chicken

Tegan, Boyd , Chris Butler, Zoha Qureshi

University of Central Oklahoma

Lesser Prairie-Chickens have a very restricted range, breeding in areas dominated by sand sagebrush (Artemisia filifolia) and shinnery oak (Quercus havardi) in Kansas, Colorado, New Mexico, Oklahoma and Texas. The population has declined by 97% since the nineteenth century and the U.S. Fish and Wildlife Service recently proposed listing Lesser Prairie-Chickens as “Threatened”. The goal of our project was to determine how climate change may affect the distribution of this species by the 2050s. Location data was downloaded from ORNIS and bioclimatic variables were downloaded from Worldclim. We used Maxent to determine which bioclimatic variables were most important. We used three scenarios from IPCC 4 (A1b, A2 and B2) in order to project how the range might shift by the 2050s. We found the current distribution was determined by altitude, precipitation of driest month and mean temperature of driest quarter. Under all three scenarios, the range of the Lesser Prairie-Chicken shifted north and the area of highly bioclimatic conditions declined. These results suggest that climate change may be an additional stressor on this rare and declining species.

05.03.100 Enzymatic Activity and Azo dye Metabolism in Sarcina Aurantiaca

Kj, Abraham , Tanjanique Reed, Tiffany Glover

Langston University

Azo dyes are widely used in cosmetic, textile, food and pharmaceutical industries. They metabolize azo dyes to colorless aromatic amines. The ability of human intestinal microbes to interact with metabolites directly or after recirculation may contribute toward different toxicological disorders and disease. Azoreductases from bacteria represent a novel family of enzymes with little similarity to other reductases. The hypothesis is that the azoreductase enzyme is present in S. aurantiaca, a human intestinal bacterium that will biotransform the azo dye to one or more compounds. The azo dye, Direct Blue -15 was treated with cultures of S. aurantiaca. Our studies demonstrated that S. aurantiaca was able to reduce the azo dye at different concentrations. The degradation of the azo dye indicates that azoreductase was functionally expressed in the bacterium. These results warrant further study to isolate the azoreductase gene followed by DNA sequence analysis.

05.03.101 Do the Cucumbers Still Squirt in a Drought? Population Fluctuations of Squirting Cucumber, Cyclanthera Dissecta

Alfa, Abame

Southwestern Oklahoma State University

Cyclanthera dissecta (Cucurbitaceae) is a weedy annual vine native to western Oklahoma. This species has been poorly studied, but is closely related to medicinal and edible species, including Cyclanthera pedata and agricultural weeds. We have tracked changes in a population of Cyclanthera dissecta near Weatherford, Oklahoma, for four years in order to determine baseline population size and effects of unusual weather conditions on this plant. We compare population size, average plant size, and average number of fruits per plant for the four seasons, and look at environmental factors, particularly drought and early freezes, that may influence plant growth and survival.

05.03.102 Review: The Role of Flavonoid Didymin in Ras Kinase Inhibitory Protein Cancer Pathways.

Mark, Cox

Northeastern State University

: This is a review abstract of “Novel Flavonoid Didymin Inhibits Neuroblastomas” Phytochemicals are naturally occurring chemicals found in plants, and have been widely used as an alternative medicine for thousands of years, flavonoids are a group of phytochemicals that have been of recent interest in medical research. Dydymin is a flavoniod, a study by Fahd Al-Mulla at Kuwait University, has shown a significant role in the regulation of Ras Kinase inhibitory proteins. In neuroblastomas Ras Kinase inhibitory proteins (RKIP), have previously displayed the ability to modulate the expression and stability of molecules associated with cancer, specifically cyclin D1, vimentin, p21, and GSK3beta(Al-Mulla 2012). A better understanding of this flavonoid and it’s importance of RKIP regulation could rid the use of dangerous drugs with adverse effects such as rituximab, DETANONOate, and trichostatin. A better understanding of didymin will lead to whether or not it could be a safer treatment in cancers that already express RKIP, or if it should be limited to RKIP-depleted cancers(Al-Mulla 2012).

05.03.103 Association Between Bronchial Asthma and TNF

Tiffani, Wood , Kevin Wang

Northeastern State University

The potential causes of bronchial asthma have been studied very extensively in recent publications. The aim of this study was to research the association between bronchial asthma and tumor necrosis factor (TNF) as a possible cause of the disease. Methods: I used EBSCOhost to search for the latest publications including the keywords “tnf” and “asthma.” I chose three of the most recent publications pertaining to my topic to research. Results: TNF-α polymorphism, TNF-α-308G/A, was shown to have an association with asthma in Egyptian children (Shaker, Sadik & El-Hamid, 2013, p.799). Significantly increased levels of TNF and TNF receptors were identified in the sera of patients with bronchial asthma compared to healthy patients (Golikova, Lopatnikova, Kovalevskaya-Kucheryavenko, Nepomnyashih & Sennikov, 2013, p.705). TNF antagonist treatment was shown to be more effective in reducing goblet cell numbers in the lungs than the corticosteroid treatments that are currently being used to treat bronchial asthma (Yilmaz, Karaman, Bagriyank, Firinci, Kiray, Turkeli & Yuksel, 2013, p.771). Conclusion: TNF has been shown to have many associations with bronchial asthma, establishing it as a likely candidate for further research into the cause of the disease. I believe that further research into these associations is pertinent, in that this research could be used for further treatment options for the disease.

05.03.104 Effects of Hyperglycemia and Advanced Glycation End-Products on Actin Cytoskeleton and Focal Adhesions in Wound Healing in Vitro

Michael, Williams , Barbara Safiejko-Mroczka

University of Oklahoma

Diabetes mellitus is a serious health problem worldwide. Diabetics are subject to a number of serious health risks and complications, one of which is impaired wound healing. Previous studies in our lab have shown that human gingival fibroblasts in vitro show delay in the rate of wound population under diabetic conditions, as compared to those in physiological glucose levels. Population of wound space by gingival fibroblasts depends mostly on cell migration and proliferation. Cell migration involves a number of factors, including the dynamic rearrangement of the actin cytoskeleton, and the formation and maintenance of focal adhesions. I hypothesize that one or both of these processes are impaired in diabetic conditions. To test this hypothesis, I created artificial wounds using gingival fibroblasts in conditions that mimic a diabetic environment. I monitored healing wounds in different experimental conditions with a phase contrast microscope. I also fluorescently labeled actin to examine its distribution in cells at the wound edge using florescence microscopy. So far, microscopic analysis of the actin cytoskeleton has shown a decrease in the number and size of protrusions at the leading edge of migrating cells in the presence of hyperglycemia and glycated proteins. I am currently studying the distribution of focal adhesions to determine if their dynamics may affect the migration of fibroblasts in the process of wound healing as well.

05.03.105 Preventative Measures Against Diabetes and Obesity among Native American Communities: Exploring the Impact of Environmental Interventions (A Review)

Jiles, Pourier

Northeastern State University

Among American Indian communities, obesity and diabetes are diseases, which continue to persist at a much greater rate compared to other ethnic minorities. Although the steps to counteract this trend are known, like working to improve the average diet and increase the physical activity of the population through environmental interventions, only a small amount of work has been accomplished within American Indian communities. As a result 3 case studies were created. The first case study included a child centered school-based trial known as the Pathways trial. The next trial focused on individual food preparers and shoppers within a food-store program called the Apache Healthy Stores Program. The last trial was unique because it incorporated multiple institutions, including the local food stores, elementary schools, and health and social service agencies, and it focused on the adult First Nation employees of each institution. The results obtained from these 3 trials were varied, but the lessons gained are more important. The results showed the need for a more focused approach to supply and demand, institutional and multilevel tactics, and a securing a sustainable base for the programs.

05.03.106 Effect of Estradiol on c-Fos Immunolabeling in the Brain of Furosemide Treated Female Rats

Sheri, Toal , Kathleen Curtis

Oklahoma State University

Objectives: We examined CNS activation in response to body Na+ depletion using the natriuretic drug furosemide to compare responses to short-term and long-term Na+ depletion, and to determine whether estradiol alters CNS responses to Na+ depletion. Methods: Adult female rats were OVX, recovered for 7 days, then given estradiol benzoate (EB) or oil vehicle (OIL). Furosemide treatment (Furo) followed one of two protocols: 1) short-term – 2hrs after Furo, rats were anesthetized and perfused with paraformaldehyde; brains were removed and cut into 40µ sections; 2) long-term – rats were returned to their cages for 20hrs after Furo, and then processed as described. Sections were immunolabeled for fos (Santa Cruz; 1:30000), mounted on slides, and examined under a microscope. Results: Fos immunolabeling was apparent in the supraoptic and paraventricular nuclei of the hypothalamus of both EB- and OIL-treated rats after short-term, but not long-term, Na+ depletion. In forebrain circumventricular organs, fos immunolabeling was present after both short-term and long-term Na+ depletion. Conclusion: CNS areas involved in body fluid balance are differentially activated by Na+ depletion depending on the length of the depletion. Thus, CNS responses to Na+ depletion are a function of the duration of the depletion and may be further influenced by the ovarian hormone estrogen.

05.03.107 Identification of Microbes

Kameron, Lindsay

Langston University

Microbes utilizing asphalt as a food source are being identified using the 16s ribosomal subunit. Genomic DNA from the microbe in question is being isolated using the alkaline lysis method. Future experiments included elongating the 16s ribosomal gene using a standard E. coli probe. The Resulting information will be run against a data base to obtain the Genus and species name of the bacteria.

05.03.108 Mps1 Protein Kinase Acts Through Dam1 to Regulate Chromosome Segregation

Jamin, Brown , Dean Dawson, Regis Meyer

Southwestern Oklahoma State University

The improper partitioning of chromosomes during cellular division is a deleterious event that leads to chromosome imbalances. Such imbalances are a common feature of a number of human diseases. Interestingly, the proteins that mediate chromosome segregation for ensuing division are often overexpressed in cancer cells, rendering these modulators appealing targets for therapeutic treatments. One such protein is the conserved kinase Mps1, which is essential to the process by which chromosomes are correctly oriented and attached on the spindle for segregation. It is known that Mps1 regulates chromosome segregation by the phosphorylation of several target proteins, including Dam1, a component of the kinetochore to which spindle fibers attach. It is less clear, however, what role the phosphorylation of Dam1 by Mps1 serves in properly orienting chromosomes on the spindle. In characterizing this role, we imaged yeast cells expressing mutant forms of Dam1 incapable of being phosphorylated by Mps1 to determine if this regulation is necessary for promoting the proper segregation of chromosomes. In addition, we attempted to rescue the defective segregation of mps1 mutants by expressing forms of Dam1 mimicking an Mps1 phosphorylated state. Our results suggest that Mps1 acts to orient chromosomes in part through Dam1. Ultimately, these findings are important in providing a more complete understanding of how chromosomes are correctly segregated during cellular division.

05.03.109 Decision-Making in Conflicting Behaviors of Field Collected Fruit Flies (Drosophila Melanogaster)

Irene, Lopez , Jimena Aracena

Southwestern Oklahoma State University

Fruit flies (Drosophila melanogaster) are excellent models to study the genetic basis of behavior. Our main purpose is to test the flies' ability to make decisions between conflicting excitatory inputs: feeding and mating. Individual virgin and previously mated flies of both sexes were placed in plastic vials and deprived of food for 0 or 24 hours. One male and one female were placed in a testing arena containing food. We recorded the hierarchy of behaviors (mating, grooming, feeding, or courting) as well as the time spent on each behavior for each individual fly. Preliminary observations suggest that both virgin and previously mated flies spend about fifty percent of their time walking and exploring. It also has shown that mating status highly influences their behavior. Virgin flies spent more time courting than mated flies. Mated flies were more likely to feed than virgin flies.

05.03.110 Integrative Biological Effects of the Neonicotinoid Pesticide Imidacloprid in Honey Bees

Trimelle, Polk , Ahmed Karahan, Brianna Levinson, Corey BowerDilan Ikizoglu, Ibrahim Çakmak, John HranitzLauren Blatzheim

Other

Foraging in honey bees is a highly integrated behavior involving numerous reflexes and motor programs. The proboscis extension reflex (PER) is an important motor program, integrated with motor control of locomotion, in the honey bee feeding behavior. Our study investigated the effect of sublethal doses, ranging from 1/5 to 1/500 of the LD50 for imidacloprid, on the PER and motor responses of honey bees. We tested the PER using 0% sucrose (water), 10% sucrose, and 30% sucrose solutions before and after the administration of imidacloprid to harnessed bees. Bees in our study exhibited a scaled response to the different sucrose solutions, with a higher rate of response to 30% sucrose solution than the 10% sucrose solution. Sublethal doses of imidacloprid at 1/5 LD50 impaired the sucrose sensitivity response in honey bees (Wilke's Lambda=0.549, F=2.819, P=0.0006). At lower doses of imidacloprid (<1/5 LD50), bees did not perform differently than controls. At 4 h post-ingestion, honey bees were scored for their motor coordination. Bees fed doses of imidacloprid higher than 1/100 LD50 showed reduced motor coordination similar to that of thermally stressed honey bees. These results show that imidacloprid, even at doses 1/5 to 1/100 LD50, impaired basic motor coordination fundamental to locomotion and foraging. Sublethal doses of thiamethoxam disrupted two components of foraging, the PER and overall motor control, normally integrated by the nervous system in the honey bee.

05.03.111 Hormesis: An Integrative Model for Stressors Affecting Honey Bees

Corey, Bower , Charles Abramson, Ibrahim Çakmak, John HranitzNazmiye Günes

Other

Stress proteins are highly conserved among all organisms and allow for organisms to survive environmental stresses by protecting proteins under diverse environmental conditions. Previously, we showed that ethanol ingestion affects bee physiology and behavior in ways similar to humans; including increased blood alcohol content, reduced locomotor activity and coordination, impaired cognition, increased aggression, and poor communication among worker bees. Honey bees also exhibit a hormetic dose-dependent stress response to ethanol. We used honey bee microarrays to study gene expression in the brain at 0 h and 4 h post-feeding of an ethanol dose that stimulates a maximum compensatory stress response (intoxication). Microarray analysis detected 603 reporters that differed between treatment and control bees. Ethanol-induced stress altered expression of gene networks for cell signaling and stress tolerance, promote oxidoreduction balance, maintain chemical homeostasis, regulate locomotion, and communication. These coincide remarkably well to the externally visible symptoms in physiology and behavior. In parallel studies, we observed similar sublethal dose responses for pyrethroid and neonicotinoid pesticides. We suggest that the study of the responses by gene networks are useful to integrate genetic, physiological, and behavioral affects of pesticides on honey bees.