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03. Biology

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Abstracts from the 2013 Oklahoma Research Day

Held at the University of Central Oklahoma

05. Mathematics and Science

03. Biology

05.03.01 VSM-1's Role in Mitochondrial Localization

Timothy Stein, Andrea Holgado,

Southwestern Oklahoma State University

VSM1 is a protein first identified as a synaptobrevin-like interacting partner in yeast. Gerst and colleagues showed that in the absence of VSM1, more exocytic functions take place, suggesting VSM1's inhibition roles in membrane fusion. Studies from our lab show the *C. elegans* homologue of yeast VSM1 seems to play a similar role in the nervous system. Genome-wide analysis demonstrated that a family of genes coding for Major Sperm Proteins (MSPs) is specifically activated in VSM-1 mutant backgrounds, leading us to believe that MSPs and VSM-1 both may regulate synaptic function. Previous research also shows that in the case of fruit flies, MSPs are important in the regulation of mitochondrial localization and growth cone morphology. We hypothesize that the synaptic role of VSM-1 may be to modulate MSP function and mitochondrial localization. To test this hypothesis, a strain of *C. elegans* containing body wall muscle mitochondrial GFP was crossed with a strain lacking expression of VSM-1, as well as a strain overexpressing VSM-1. Florescent analysis of mitochondrial localization shows a lack of VSM-1 does not interfere with the localization of the mitochondria, however, overexpression of neuronal VSM-1::GFP significantly altered mitochondrial morphology and localization in body wall muscle. Currently, we are examining whether this phenotype is dependent on the presence of MSPs in *C. elegans*. This analysis involves the use of RNAi for MSPs and further mitochondrial examination.

05.03.02 Analyzing Modulators of Vesicle Fusion and Synaptic Signaling

Jamin Brown, Andrea Holgado, Elizabeth St. John, Monte Stone,

Southwestern Oklahoma State University

Synaptic transmission in *C. elegans* is mediated by VSM-1, a SNARE interacting protein that prevents the formation of SNARE complexes. Our preliminary results show that in the absence of VSM-1, *C. elegans* experience an increased rate of synaptic transmission, suggesting that in this case SNARE complex formation occurs without inhibition. In characterizing the functional role of VSM-1, we hypothesize that VSM-1 may act by preventing vesicle fusion, thus inhibiting the release of neurotransmitters. Mutant rescue attempts using microinjections of recombinant DNA plasmids suggest that expression of VSM-1 fused to GFP in nerve cells alone is not sufficient to reverse the effects of the VSM-1 mutation and restore the mutant to the wild-type phenotype. To further elucidate whether lack of rescue was due to expression in neurons only or due to GFP altering the normal functional role of VSM-1, we began producing transgenic lines expressing VSM-1 and fluorescently labeled VSM-1 in muscle cells, nerve cells, and both. Initial rescue analyses using an aldicarb medium followed by additional studies using transgenic lines show that expression of VSM-1 did not result in a reversion to the wild-type phenotype. Instead, we scored a significant hypersensitivity to the aldicarb, indicative of enhanced synaptic activity. Construction of additional nematode lines expressing non-fluorescent versions of VSM-1 in these tissues is underway.

05.03.03 Molecular Components Controlling Synapses in Nematodes

Ashley Rodriguez, Andrea Holgado, Josiah Dittrich, Kody McKay, Melanie Graham,

Southwestern Oklahoma State University

A synapse is a cellular junction that is formed by the presynaptic terminal of the signaling cell and the postsynaptic terminal of the target cell. A neuron communicates to other neurons by secreting neurotransmitters into synapses, which then bind to receptors on the target cell. Previous studies have shown that a protein, VSM-1, regulates the exocytosis of neurotransmitters. Additionally, *vsm-1* mutants have shown an increase in synaptogenesis. We hypothesized that genes are expressed in *vsm-1* mutants that enhances synaptogenesis. In order to analyze the genes of interest we utilized the tools of microarray. In our experiments, we first isolated the total RNA from young-adult wild-type and *vsm-1* mutant *Caenorhabditis elegans*. Next, we synthesized cDNA from reverse transcription of the isolated RNA. Hybridization of the cDNA to a microarray was performed to facilitate gene expression profiling. Fluorescently labeled microarrays were analyzed and the identities of induced and repressed genes were uncovered using the open source software called Magic tool. Microarray experiments were performed using three biological replicas and two technical dye swaps. Preliminary work showed over-expression of genes coding for major sperm proteins in a *vsm-1* mutant containing increased synaptic signaling. Microarray results were validated using real time PCR. Further research includes analysis of RNAi phenotypes after expression of major sperm protein family is knocked out.

05.03.04 Probing molecules involved in calcium-regulated membrane fusion

Claudia Nkeih, Andrea Holgado, LaKesha Seals, Nathan Bernhardt,

Southwestern Oklahoma State University

VSM-1 is a protein believed to be involved in the regulation of neuronal exocytosis through interactions with exocytic proteins called SNAREs. While working with yeast, Jeffery Gerst showed that VSM-1 contains a retroviral protease (RVP) domain which is essential in the regulation of this process. Based on these and other findings, we hypothesize that VSM-1 may bind to and cleave the neuronal v-SNARE synaptobrevin, and thereby inhibit neuronal exocytosis. To test this hypothesis, we constructed recombinant plasmids, using site directed mutagenesis and other molecular biology approaches, which could express fusion proteins such as VSM-1 and SNAREs. These fusion proteins would later be isolated and employed in bait and prey pull down, as well as protein cleavage, assays. Results showed that the v-SNARE protein synaptobrevin binds to full length VSM-1 and that the amino terminus portion of the protein seems to be important for this interaction. Furthermore, analyses of cleavage studies showed no apparent reduction in size of synaptobrevin, suggesting that cleavage does not occur or is undetectable by the technical approach used. Furthermore, we determined that synaptobrevin does not seem to be the substrate for the RVP catalytic activity of VSM-1. However, we are currently investigating cleavage assays for potential catalytic activity using a more sensitive technique such as HPLC.

05.03.05 Genetically-Programmed Plant Marker Gene Deletion with Bxb1-att Site-Specific Recombination System

Frank Yau, Kevin Wang, Mona Easterling,

Northeastern State University

An important tool for the production of GM crops is the selectable marker gene (SMG), which allows for the identification of a few transformed plants from among the bulk of non-transformed plants. The SMG, usually an antibiotic or herbicide-resistance gene, remains in the genome of GM crops. Regulatory agencies and the public have raised concerns about the presence of SMGs due to food safety and environmental issues. Several strategies have been employed in plant genetic transformation to remove SMGs, including site-specific recombination (SSR) systems. The mycobacteriophage Bxb1 SSR system has been used in plant transgenesis to excise SMGs. The objective of this research is to use Bxb1, a uni-directional SSR system, to excise the SMG and render it unable to reinsert into the genome of the tobacco plant. The Bxb1 recombinase is codon-optimized to express in plants and is driven by a tissue-specific seed promoter. The binary vector was designed to allow the SSR system to delete both the SMG and the recombinase-coding region from the genome of the tobacco plant. The vector was transformed into tobacco, and T0 putative transgenic plants were obtained. GUS-positive T0 lines were transferred to soil for setting T1 seeds and used for excision analysis. Bxb1-mediated excision was preliminarily identified in T1 seeds, and T1 plants through junction PCR analysis. Sequencing has confirmed successful excision results.

05.03.06 Production of vampire bat saliva enzyme in transgenic plants for stroke treatment

Mona Easterling, Frank Yau, Kevin Wang, Maaike Mccutcheon,

Northeastern State University

Stroke is the third leading cause of death in the US and a leading cause of adult disability. Plasminogen activators (DSPAs), enzymes from the saliva of blood-feeding vampire bats, have been found to act only on fibrin without excess brain bleeding. Clinical trials have shown that it can be used to treat urgent stroke patients without increasing risk for additional brain damage. Currently, recombinant DSPAs are produced in transformed yeast, animal cells, and insect cells. However, the yields of DSPAs produced from yeast and insect or animal cells are relatively low. Our research is using transgenic plants to produce DSPAs for stroke that are active, safe and inexpensive. We have developed the suitable plant transformation vectors for DSPA α 1 and DSPA α 2. DSPA α 1 and DSPA α 2 codons were optimized for tobacco plant. DSPAs were linked with ER signal peptides to minimize foreign protein degradation. Seed-specific promoter was used to express DSPAs because foreign proteins accumulated in seeds have been found to retain activity after more than three years of storage at room temperature. Tobacco plant transformation was accomplished. The tissue- cultured plants selected from antibiotic kanamycin have been transferred to soil and preliminary testing is underway.

05.03.07 Genetic Screening: Revealing the Components of the Cgi Reglatory System of Complementary Chromatic Acclimation in Fremyella Diplosiphon

Terry Phillips,

Langston University

Some of the most prevalent organisms that use photosynthesis are plants, algae, and cyanobacteria. In order to efficiently harvest light energy to be used in photosynthesis, the cyanobacterium, Fremyella diplosiphon, undergoes cellular changes in response to varying environmental conditions. It has been known that F. diplosiphon adjusts its pigmentation in order to optimally absorb the environmental light color. This process is known as Complementary Chromatic Adaptation (CCA). The pigment change of the organism is due to a change in protein composition. In red light, the protein pycocyanin (PC) is produced and in green light, phycoerythrin (PE) is made. This is due to a change in gene expression and is controlled by two systems; the Rca and the Cgi systems. The Rca system is a signal transduction pathway in which RcaE senses red light and autophosphorylates. In turn, it is able to phosphorylate RcaF which phosphorylates RcaC. When phosphorylated, RcaC binds to a specific DNA sequence to activate PC related genes and repress PE related genes. However, in the absence of the Rca system, the levels of PE are still regulated. This additional regulation of PE is due to a second system called the Cgi system. We are conducting a mutant screen to find components of the Cgi system by using a transposon mutagenesis of cells lacking Rca system. The site of transposon insertion has been evaluated for four brown mutants of F. diplosiphon.

05.03.08 Use of Algae to Remove Cadmium from Aquatic Environments

Carmen Cowo, Jim Bidlack,

University of Central Oklahoma

Removal of pollutants from water using aquatic species is a well-documented topic in scientific literature. For example, water contaminated with cadmium, which is detrimental to the health of residing aquatic life as well as humans, may be remediated through use of algal species that accumulate this heavy metal. It has been shown that the blue-green algal species, *Spirulina platensis*, can uptake cadmium in surrounding water systems and remain viable. In this investigation, cadmium uptake by *Spirulina* will be evaluated using aquarium tanks, with a 6.5 liter capacity, in a controlled environmental chamber. After a standard amount of algae biomass has accumulated, cadmium will be added to implement treatments to equate 0.0, 1.0, 1.5, 2.0, and 2.5 milligrams of cadmium per liter. The *Spirulina* in each of these treatments will be grown for 20 days and then the biomass will be collected, as well as the water in each of the tanks. Fresh algae biomass, as well as water volume, will be measured first and then a sample of each will be set aside for cadmium determinations by atomic absorption spectrometry. The remaining algae biomass will be used for protein and other analyses, as well as dry weight measurements. Results will be used to determine if *Spirulina* can remove cadmium from water and how the algal species is affected by cadmium treatments.

05.03.09 Evaluation of Solvents used to Extract Chlorophyll for Photovoltaic Cells

Chelsie Johnson, Jim Bidlack,

University of Central Oklahoma

An experiment was conducted to evaluate several solvents used to extract chlorophyll from spinach for eventual use in photovoltaic cells. These cells were constructed with tin-oxide coated plates; the cathode was treated with graphite and the anode contained chlorophyll extracts embedded in titanium dioxide. Once treated with titanium dioxide, each anode was soaked in chlorophyll preparations made with one of three different solvents including ethanol, acetone, and water, for a period of 4 to 10 days. After air-drying anodes, complete photovoltaic cells were assembled with a drop of iodine / potassium iodide conducting solution, sandwiched between the plates. The cells were first tested to ensure that they produced significantly higher voltage in the presence of light compared to complete darkness. Power curves (in light) were then constructed for these cells using a resistance replacement box and maximum power was used to determine which resistance should be used for cells to measure voltage over a period of 10 to 30 days. Preliminary results demonstrated that photovoltaic cells constructed with acetone-extracted and ethanol-extracted chlorophyll can produce up to 350 millivolts, whereas cells constructed with water-extracted chlorophyll are unstable and, generally produce about 298 millivolts. We are currently in the process of evaluating the longevity of these cells and whether or not the same treatment differences exist over a longer period of time.

05.03.10 Continued Investigations on Use of Dragon's Blood Pigment in Photovoltaic Cells

Brett Jones, Jim Bidlack,

University of Central Oklahoma

Both laboratory investigations and statistical analyses were pursued during the past year to gain additional information about the use of Dragon's Blood (*Daemonorops draco*) in photovoltaic cells. In general, experiments conducted in Fall 2011 provided similar results compared with experiments during the previous year. In both of these experiments, the voltage values in cells treated with the pigment were significantly higher than values from control cells, which contained no pigment. It was decided to focus on calculating current and power readings from data collected and conclude these investigations with a manuscript for potential publication. As such, statistical analyses demonstrated that photovoltaic cells made with Dragon's Blood produced average voltage, current, and power readings of 150 millivolts, 1.68 microamps, and 0.289 microamps, respectively, over a period of 19 days. These readings were significantly higher than values obtained at night and substantially higher than values obtained from cells constructed without pigment. The low cost of constructing these cells, coupled with their longevity, suggests that they have potential as economically-feasible and sustainable energy alternatives.

05.03.11 Use of Chloroplasts and Anthocyanin in Photovoltaic Cells

Hunter Porter, Jim Bidlack, Theodore Tetreault,

University of Central Oklahoma

An experiment was designed to determine the viability of using chloroplasts and concentrated anthocyanin in dye-sensitized solar (photovoltaic) cells. These cells were made using glass plates with a film of tin oxide; one coated with titanium dioxide embedded with pigment to serve as the anode and another coated with graphite to serve as the cathode. Anodes were soaked with chloroplasts extracted from spinach (*Spinacia oleracea*), or anthocyanin derived from the leaves of purple heart (*Tradescantia pallida*) or anthocyanin from red cabbage (*Brassica oleracea*), in order to embed pigments within the titanium dioxide. A KI/I₂ electrolyte solution was sandwiched between the anode and cathode cells and opposing ends were connected to a voltmeter which recorded output over time using a Pico Recorder. Use of chloroplasts in anodes showed promising results, with some cells yielding over 800 millivolts per cell, whereas application of concentrated anthocyanin to anodes produced an average of 400 to 600 millivolts. Both chloroplasts and anthocyanin treatments produced voltages that were significantly above control counterparts, which averaged about 100 millivolts per cell. A preliminary longevity test of anthocyanin showed a voltage increase over a period of 15 days. Longevity tests for chloroplast and concentrated anthocyanin cells are currently being investigated.

05.03.12 Height and Biomass of a Barley - Soybean Rotation Subjected to Gibberellic and Jasmonic Acid Treatments

Matthew Johnson, Anna Graves, Dillon McDaniel, Hunter Porter, Jim Bidlack, Jonna Whetsel, Matthew Naifeh,

University of Central Oklahoma

An experiment was conducted using gibberellic acid (GA), jasmonic acid (JA), and combinations thereof, to determine their potential in altering height and biomass of barley (*Hordeum vulgare* L.) grown during the winter, followed by soybean [*Glycine max* (L.) Merr.] grown during the summer. Treatments included 0.0 mM, 0.5 mM, 1.5 mM, and 3.0 mM applications of GA and JA, and combinations thereof, applied exogenously shortly after emergence for barley during the winter/spring and soybean during the summer/fall growing seasons. Plants were harvested at maturity and several measurements, including plant height, and weight of plant and plant components, were taken to assess responses to treatments. In general, GA increased height of soybean and JA decreased height of both barley and soybean. Although there were few significant differences among treatments in plant biomass, a trend demonstrated that JA consistently decreased biomass in both species. These results suggest that that GA and JA can be used to manipulate height in barley and soybean without substantial loss in biomass yield.

05.03.13 Increasing the Number of Native Americans in Natural Science and Medicine through Field Paleontology

Tanya Chapman,

East Central University

Statistics taken by the US Census Bureau and the National Science Foundation indicate that the number of Native Americans earning degrees is the lowest among all ethnic groups. In 2008, Native Americans earned only 0.4% out of 533 doctorates in the Earth Sciences and 0.4% out of 5,135 doctorates in the Biological Sciences. Can exposure to these sciences increase the numbers of Native Americans earning degrees in these fields? The Native explorer Foundation gives Native American Students an opportunity to experience some of what the natural sciences has to offer. This research began at OSU College of Health Sciences followed by 1 week in the Oklahoma panhandle Field work in the techniques utilized in field Paleontology. Working side by side with scientists that have real world experience in field research. It concludes at East Central University in Ada Oklahoma. It will take numerous semesters to be able to fairly determine the Number of Native American students that will be affected through this experience.

05.03.14 Macroinvertebrate Assemblages and Water Quality Analysis of Spring Systems Associated with the Pontotoc Ridge Nature Preserve, Oklahoma

Kambridge Brown, David Bass,

University of Central Oklahoma

A study of springs in the Pontotoc Ridge Nature Preserve was conducted in 2011. This investigation compares the similarities between a 1995 survey (Bass 2000) and the 2011 survey, as well as between individual spring communities within that study. Quantitative samples of macroinvertebrates were collected using a Surber net, preserved, and returned to the laboratory for sorting, identification, and counting. In addition, qualitative samples were taken to capture species missed in the Surber net by using a D-ring net. Water quality analyses were used to test for ammonia, alkalinity, temperature, pH, dissolved oxygen, nitrates, nitrites, orthophosphates, and specific conductivity. Only quantitative data was used to calculate the Shannon-Wiener Species Diversity Index and those results are as follows: Smith Spring, 1.934 (2011) and 2.69 (1995); Cave Spring, 0.410 (2011) and 3.31 (1995); and Canyon Spring, 0.327 (2011). Similarities in species compositions, based on both quantitative and qualitative samples, was calculated using Sorenson's Index of Similarity and the following results were found: Smith Spring (1995 v. 2011), 0.5; Cave Spring (1995 v. 2011), 0.077. Species composition similarities were also compared between the springhead and downstream samples resulting in a value of 0.692 for Smith Spring, 0.714 for Canyon Spring, and 1.00 for Cave Spring. These data will be useful as baseline information to compare future observations in these spring communities.

05.03.15 Bioinformatics Analysis of Forkhead box P2 Gene

Katlyn Varner, Jacinta Maiorana, Jan Byrd, Kathi McDowell, Omead Ghaeli, Richard Smedley, Sarah Cragun,

Northeastern State University

The proper development of the way we speak involves neurological systems associated with specific genes. FOXP2 codes for the proteins associated with the development and ability to learn language and speak. Autosomal dominant mutations in the Forkhead box P2 (FOXP2) gene cause speech and language abnormalities. Online Mendelian Inheritance in Man (OMIM), Genbank, Basic Local Alignment Tool (BLAST), Spidey, and Proteins are databases utilized in research of genetic disorders such as FOXP2. OMIM lists the location of the FOXP2 gene on chromosome 7-section q31.1 with 603Kp of genomic DNA. According to GenBank, the accession number of FOXP2 is NM_148898.3, and the organism is Homo sapiens with a sequence length of 6448 bp that codes for 740 amino acids. The three dimensional protein figure illustrates 6 domains each containing 2 beta- sheets and 3 alpha helices. The sequence NM_148898.3 is an mRNA with a coding region ranging from nucleotide 357-2597. A comparison between this mRNA and the DNA for this gene (NG_007491.2) indicates coverage of 91%, a percent identity of 100% and 16 exons on the Spidey database. By examining and learning about the FOXP2 gene through OMIM, GenBank, Spidey, Blast, and Protein databases, we are able to learn and better understand the processes that modern geneticists use when studying a particular gene.

05.03.16 Genetic variation within striped skunks in the northern and southern areas of the United States.

Sharonda Carson,

University of Central Oklahoma

Striped skunks (*Mephitis mephitis*) are found throughout the United States, in southern Canada, and northern Mexico. Skunks are vectors for rabies, of which there are three known rabies variants: one in the south central US, one in the north central US, and another in California. Research conducted on striped skunks has only studied isolated geographical standpoints, rather than comparing the skunks from all geographical areas simultaneously. Few genetic studies have been performed on *Mephitis mephitis*, and none have looked at the potential genetic subspecies. We hypothesized that infected *Mephitis mephitis* in the north and south represent more than one distinct genetic variant of skunks. DNA Tissue samples were collected from both the northern and the southern areas and DNA sequences from the mitochondrial DNA D-loop are being analyzed. Northern areas include WY, MO, IA, ND, and NE; southern areas include AZ, TX, KS, OK, and CA. Preliminary data does not appear to show a distinct demarcation between northern and southern skunks, although additional data is still being generated

05.03.17 Molecular evidence for hybridization between *Neotoma floridana* and *Neotoma micropus* in multiple areas of sympatry

Michelle Haynie, Matthew Mauldin, Robert Bradley,

University of Central Oklahoma

The southern plains woodrat (*Neotoma micropus*) and the eastern woodrat (*N. floridana*) have a parapatric distribution that extends ~2,200 km from the Gulf of Mexico to southeastern Colorado. In 1968, and again in 1973, an area of sympatry where hybridization occurred was reported in western Oklahoma; hybridization was determined based on morphological measurements and laboratory breeding experiments. The objectives of this research are to 1) evaluate the known hybrid zone using molecular markers and 2) determine if additional areas of sympatry and hybridization occur. To date, 103 samples from the western Oklahoma hybrid zone (collected in 1988) have been genotyped at multiple loci and a high degree of hybridization (~85%) has been detected. Thirty-six localities outside the original zone of sympatry were surveyed and preliminary data indicates additional putative areas of hybridization between these two species. Future research will focus on further defining the boundaries of hybridization between the two species as well as determining the dynamics that maintain the zones.

05.03.18 Identification of Proliferative Myofibroblasts of Dupuytren's Contracture Cells

Tobi Odejimi, Melville Vaughan,

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Myofibroblasts are granular tissue fibroblasts that play a big role in wound contraction and synthesis of extracellular matrix components (Lorena et., al 2002). Dupuytren's contracture is a painless thickening and contracture of tissue beneath the skin on the palm of the hand and fingers. It is known that granular tissue proliferates but the goal of this experiment is to see if pathological fibroblasts proliferate, myofibroblasts proliferate, or if both undergo proliferation. This will be accomplished by using 5-ethynyl-2'-deoxyuridine (EdU) to better understand the process of proliferation in Dupuytren's contracture (DP) myofibroblasts. By treating different Dupuytren's contracture cells with EdU one is able to identify if the DNA replicated and thus the Dupuytren's contracture myofibroblasts proliferated.

05.03.20 The Budding Yeast Mcm10 Interacts with Polymerase Epsilon and Functions during Leading Strand DNA Replication

Brandy Fultz, Chance Hendrix, Sapna Das-Bradoo,

Northeastern State University

Evolutionarily conserved minichromosome maintenance protein 10 (Mcm10) plays a key role in DNA replication initiation and elongation. In eukaryotic cells, Mcm10 has been shown to interact with multiple replication fork proteins. In addition, Mcm10 has been shown to have a crucial interaction with polymerase alpha primase complex (Pol α). While Pol α is essential in initiating DNA replication, polymerase delta (Pol δ) and polymerase epsilon (Pol ϵ) carry out the bulk of DNA synthesis. Recent studies indicate that, during DNA replication, Pol δ synthesizes lagging strand DNA while pol ϵ synthesizes leading strand DNA. Here, we set out to determine if Mcm10 interacts with Pol δ and Pol ϵ in budding yeast, *Saccharomyces cerevisiae*. Both Pol δ and Pol ϵ are composed of several subunits in *S. cerevisiae*. Pol δ is a heterotrimer that contains the subunits pol3, pol31, and pol32. Pol ϵ is a heterotetrameric complex that comprises three small subunits (Dpb2, Dpb3, and Dpb4) and one large catalytic subunit (pol2). Our studies show a direct interaction between Mcm10 and polymerase epsilon. Furthermore, we show that Mcm10 interacts with the catalytic subunit of polymerase epsilon, pol2, by yeast two-hybrid assay. Interestingly, no interaction between polymerase delta and Mcm10 was observed. Our findings lead us to believe that Mcm10 is part of a protein complex involved with replication of the leading strand DNA.

05.03.21 Eastern Medicine

Stephen Cates,

Northeastern State University

Traditional Chinese Medicine (TCM) has a long history and its practice is still in use today. Different from Western Medicine that requires clinical trials to establish its usefulness, TCM has long been established through years of trial and error to find treatments that work. As the effectiveness of TCM treatments gain popularity in Western countries, research is being conducted in order to elucidate how this treatment works on a physiological and pathological level as well as how it can be applied to current Western treatments.

05.03.22 Parasite Survey of the Sonoran Mud Turtle (*Kinosternon sonoriense*)

Kristen Bliss, Paul Stone, Wayne Lord,

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Parasitism has wide-reaching implications throughout the fields of ecology and medicine; while these pathogenic associations have been thoroughly documented across many taxa, parasitism among reptiles still remains severely understudied and poorly understood. Helminth infection among Testudines, specifically, is less understood; especially in regard to the effect diseased individuals may have on community health and structure. The Sonoran Mud Turtle (*Kinosternon sonoriense*) occupies an ephemeral, aquatic environment subject to seasonal drying. Little is known about the organisms parasitizing this species, specifically the study population located in the Peloncillo Mountains, New Mexico. Fecal samples were opportunistically hand-collected using catch-and-release trapping methods from May 2012 through October 2012 and preserved onsite in Zinc-PVA solution or 10% Formalin solution. Samples were concentrated and examined under light microscopy for the presence of Helminth eggs. Thus far, eggs from the genus *Capillaria* have been found in various samples. The *Capillaria* genus (Nematoda: Trichinellidae) contains filarial worms which prey upon a wide range of organisms including birds, mammals, and reptiles; however, *Capillaria* has yet to be documented within *Kinosternon sonoriense*. Further investigation into the extent of Capillariasis which exists within the Peloncillo population, as well as other possible parasitic infections within the population is warranted.

05.03.23 A review: Acupuncture in Preventing Atrial Fibrillation

Faith Fennell,

Northeastern State University

Atrial fibrillation (AF) is the most common clinical arrhythmia. Age and improved survival in cardiac disease has led to an increase in AF patients. AF patients are symptomatic and have a reduced physical ability and higher risk for thromboembolic events. AF is also associated with increased mortality. To control sinus rhythm and prevent further recurrences, antiarrhythmic drugs are commonly used even with their limited efficacy and adverse effects. In traditional Chinese Medicine, acupuncture has been found to manage certain tachycardia with recent Western studies showing treatment for arterial hypertension and chest pain. This study attempts to look at the efficacy of acupuncture in preventing or reducing the rate of AF recurrences in patients.

05.03.24 A Review on: Induced Pluripotent Stem Cells

Lauren Tull,

Northeastern State University

Dr. John B. Gurdon and Dr. Shinya Yamanaka were awarded with the 2012 Nobel Prize in Physiology or Medicine for their research that revealed mature, differentiated cells have the ability to be reprogrammed to revert back to a pluripotent stem cell state. Prior to their discovery the common thought in regards to mature cells was that once a cell differentiated it was unable to revert back to a pluripotent stem cell state. This view was changed when Dr. Gurdon discovered in 1962 that a nucleus taken from a differentiated frog intestinal epithelial cell had the ability to generate a fully functional tadpole when transplanted to an enucleated egg. Despite Dr. Gurdon's work, the question of whether an intact differentiated cell had the ability to be completely reprogrammed to become pluripotent. Dr. Yamanaka would answer this question in 2006. His research proved that the introduction of four transcription factors into a differentiated cell was enough to revert the cell to a pluripotent state. This discovery has the potential to be applied to assist in creating disease models for pharmaceutical application, which would eliminate the problems with the animal models. One problem is that some drugs that are effective in animal models such as mice are not effective in human patients. This would be eliminated because the patient's own cells could be used in the disease model. Also this discovery could be applied in regenerative medicine, also known as cell therapy.

05.03.25 Inhibition of Hepatitis C Virus (HCV) Replication and Cancer Stem Cell-Like Cell Markers by Resveratrol

Charles Nguyen, Asim Ali, Courtney Houchen, Hari Kotturi, Naushad Ali,

University of Central Oklahoma

Chronic infection of Hepatitis C virus (HCV) is a prominent risk factor for the development of liver cancer. Current FDA-approved therapy is not effective and well tolerated in many patients, and those cured of HCV still remain at risk for developing cancer. Therefore, finding a novel therapeutic that targets both HCV and HCV-induced cancer is a high priority. Resveratrol (RES) is a polyphenol that has been widely studied for its pleiotropic effects, including anticancer and antiviral activity. Since the molecular mechanism of RES is not known, our aim is to determine the effects of RES on HCV replication and HCV-induced carcinogenesis. We have used a GS5 hepatoma cell line that harbors a subgenomic HCV replicon to investigate our goal. Cells were treated with RES or DMSO vehicle. Total HCV RNA was detected by real-time RT-PCR. Western blot was carried out to analyze viral and cellular proteins including hepatic markers and cancer stem cell-related proteins. Cell viability was determined by MTS assay, and cell cycle analysis was performed using flow cytometry with PI staining. Confocal microscopy was performed to examine cytoskeletal changes. RES significantly inhibited cell growth in a dose-dependent manner and reduced HCV polymerase expression and total HCV RNA. Additionally, RES downregulated the expression of alpha-fetoprotein, a liver cancer stem cell marker. Our findings suggest that RES may be a promising therapeutic agent for HCV and HCV-induced carcinogenesis.

05.03.26 Molecular Scatology Using DNA Barcoding: Genetic Identification of Zoological Specimen and Diet Using Mitochondrial and Plastid Loci

Diana Spencer, Andrew Brown, Bobby Daugherty, Hunter Bearden, Mang Chang, Minji Sohn,

Tulsa Community College

Identification of species through noninvasive sampling removes the need to handle free-living organisms, and is particularly valuable for large carnivores or elusive species. Determination of diet and species identification success is critical to understanding the ecosystem. DNA barcoding has emerged as a powerful tool to supplement traditional methods of taxonomy. Cytochrome c Oxidase Subunit I (COI), a highly conserved 650 base pair segment of the mitochondrial genome, has become a 'global standard' to sort out broad taxonomic diversity in animals. This region is not ideal for botanical specimen as it has a slower mutation rate in plants. The Consortium for the Barcode of Life (CBOL) recommended the 2-locus combination of *rbcLa* and *matK* for plant barcoding. Our research goal was to compare a variety of DNA from feces samples to identify the organism and evaluate diet content. The DNA was extracted using a fecal DNA kit and quantified using spectrophotometry. Following PCR and gel quantification, the amplified DNA was purified and sequenced. The sequence analysis was performed by Clustal W and divergence was calculated using MEGA. Our findings show that the regions and methods chosen can effectively identify species and diet content while some prey contamination compromising the overall performance was indicated.

05.03.27 Quality Control of Undergraduate Researchers: A Cautionary Tale

Paul Stone, Chelsea Smith,

University of Central Oklahoma

Undergraduate participation in research has increased dramatically in the past decade. This trend has a host of positive benefits for undergraduate and graduate students, faculty, and institutions. However, because undergraduates are relatively inexperienced at conducting research, there should be a system of quality control in place that ensures against increasing error rates associated with data collection. Our lab is heavily involved in undergraduate research. We are committed to placing talented undergraduates in positions where they collect and analyze their own original data, and report the results in peer-reviewed journals. We are also committed to quality control. Here, we report two case studies that underline potential problems with quality control of data collected by undergraduate researchers. In both cases the undergraduate students that were primary data collectors had been working in our research lab for longer than one year and were recognized as leaders in undergraduate research in our department. In both cases, another student was asked to inspect the data generated by the undergraduate student, and in both cases many errors were found. Error rates were 61% of all samples in one case, and 55% of all samples in the other case. These results underscore the need for quality control during data collection, particularly when the person responsible for data collection is relatively inexperienced.

05.03.28 Effects of Lycopene in Watermelon Extracts on Tissue Culture Cells.

Teresa Golden, Cori Brannock, Rebekah Ritchie,

Southeastern Oklahoma State University

Lycopene is an antioxidant from the carotenoid family of phytochemicals produced in plants. It is recognizable as the red color in fruits and vegetables such as tomatoes and watermelon. Unlike many carotenoids it lacks a terminal beta-ionic ring and provitamin A activity. It is absorbed and distributed throughout the body by the circulatory system. It is the focus of nutritional and clinical studies for prevention of prostate cancer and cardiovascular disease. Antioxidant properties of lycopene are well known, but other mechanisms of action have been indicated. We are using tissue culture to further examine the roles of lycopene including the effects on cancer cell growth and potential protective roles in response to stress. In these experiments we applied watermelon extracts with known lycopene and carotenoid contents to lung carcinoma cells or normal human fibroblasts. Cells were stressed (UV or starvation) and then assayed for survival rate and protein signaling changes.

05.03.29 Scleral Ossicle overlap patterns in testudines as evidence of evolutionary divergence and specialization

Ali Siweckyj,

East Central University

Scleral ossicles are a ring of thin bony plates found in most vertebrates, especially reptiles. The scleral ossicles of turtles are of interest in that they are utilized in both aquatic and land habitats. This dual use leads to some questions about the ability of these ossicles to aid in the accommodation of the eye in different habitats. This study focuses on the sclera ossicle overlap pattern and number of imbrications found in turtles. The number of ossicles in turtles is not always the same in left and right eyes of the individuals. Each ossicle consists of multiple plates that overlap, or imbricate, each other. 319 individual turtle eyeballs were examined for this research. The number of plates per eye ranged from 8 to 14, and the number of imbrications ranged from 1 to 5. From our data, we calculated percent difference in imbrications of right and left eye of individuals. This allowed for comparisons between individuals with and between species. The number of ossicles was examined to determine if there is an evolutionary component to the number of ossicles found in different species of turtles. Ontogenetic and evolutionary considerations between and within species of the entire turtle clade is of interest to this study.

05.03.30 Light Rhythm Influence on the Growth and Perithecia Synthesis of Chaetomium Globosum, a Common Indoor Mold.

Shubhra Poudyal, Charles Biles,

East Central University

Chaetomium globosum is a fungus commonly found in water-damaged buildings and was one of the most prevalent fungi associated with damage resulting from the Katrina hurricane. The ascospores and hyphae produced by *C. globosum* can be highly allergenic to immuno-compromised people and has been reported to cause more severe respiratory health problems. Light plays a major role in growth and reproduction in several organisms and is a major determinant in circadian rhythms of mammals. Chaetomium globosum 5 mm hyphal plugs were transferred to potato dextrose agar media plate. Isolates of *C. globosum* were exposed to light rhythms; continuous dark, continuous light, 12 h light/12 h dark, 6 h light/18 h dark, and 3 h light/21 h dark. Growth was measured every 7 days. The ascospores and perithecia were measured after 21 days. Results indicated that growth was not significantly influenced by different light rhythms, but ascospore and perithecia synthesis was greater in the dark when compared to light treatments. Ring patterns of fungal perithecia growth was evident on the 12 h light/12 h dark, 6 h light/18 h dark, and 3 h light/21 h dark, suggesting that light/dark cycles stimulate a circadian-like rhythm. Proteins were extracted from *C. globosum* grown on PD broth cultures exposed to the light rhythms previously described. The continuous light treatment stimulated a unique protein that was approximately 25 kD. All treatments that included a dark sequence showed unique bands at 15 kD.

05.03.31 Overview of Oriental Medicine “Ginseng”

Faith Fennell,

Northeastern State University

The major difference between Oriental and Western or better still allopathic medicine is that the former is rooted in traditional culture, while Western medicine is part of modern empirical science. Western [allopathic] medicine turns to be popular in today's society and for that matter, people tend to doubt the efficacy of Oriental medicine. It is not surprising that in today's China, Chinese medicine is often debated. In the past 5,000 years, Chinese people have been dependent on Oriental medicine to cure diseases and to protect themselves against epidemics. Consequently, Oriental medicine has contributed to population growth throughout history. There are over 300 types of traditional medicines on the globe, however, Oriental medicine has become increasingly popular. It is not just hear say that oriental medicine is effective but rather the effectiveness of oriental medicine can be seen from the growing number of people around the world who choose to study it. By definition, Oriental medicine is a set of practical skills targeting a full array of diseases, from the common cold to more serious ones, such as tumors and heart disease. This poster highlights some advantages and disadvantages of using ginseng for treating ailments.

05.03.32 The Response of Fusarium Oxysporum Growth and Conidia Production to Light Induction.

Rajya Maharjan, Charles Biles,

East Central University

Fusarium oxysporum is a common plant pathogen and also causes several human diseases. The effect of light pulses has been shown to effect the growth and reproduction of several organisms. We conducted experiments to investigate the effect of light on Fusarium oxysporum. Plants were inoculated with the fungus and placed under light banks with regimes of 3hr light (L)/21 hr dark (D), 6 hr L/18 d, 12 L/12 D, and 24 L, and 24 D. The hyphal growth was measured every 7 days and the conidia production was quantified after 21 days. Growth was not significant among the treatments. However, conidia were most abundant in the 24 L treatments, approximately 35% greater when compared to the other treatments. A higher level of pigmentation was observed in the 24 dark after 14 days of incubation. Future experiments will attempt to isolate light induced proteins that may play a role in conidia development.

05.03.33 Investigation of the Large-Scale Functional Brain Networks Modulated by Acupuncture

Zinar Simsek,

Northeastern State University

Acupuncture is an ancient Chinese healing technique, used to treat various illnesses for thousands of years. Fine, sterile needles are applied to specific areas of the body, or acupoints, to stimulate energy flow (or "chi). The needles are usually left in place for a few minutes (skilled acupuncturist causes virtually no pain). Energy is believed to circulate throughout the body along specific pathways called meridians. When energy is flowing freely through the meridians, the immune system is stimulated, which is thought to bring on a healing response and balance. In recent years, it has gained great popularity as an alternative and complementary therapeutic intervention in the Western medicine. Noninvasive functional magnetic resonance imaging (fMRI) techniques have provided new insights into the anatomy and physiological function underlying acupuncture. This study investigated the functional correlations throughout the entire brain during the post stimulus resting period following acupuncture at acupointST36 (ACUP) in comparison with acupuncture at nearby non acupoint (SHAM). It divided the whole brain into 90 cortical and subcortical regions and constructed functional brain network for each condition. Then work hubs were examined, and statistically significant differences were identified by comparing the correlation coefficients of each pair between two conditions [17,19,20]. This allowed exploration of how the large-scale resting brain networks are modulated by acupunc

05.03.34 Neuroprotective Effects of a New Skin Care Formulation Following Ultraviolet Radiation

Kimberly Pahsetopah,

Northeastern State University

Ultraviolet radiation is an environmental factor that has major effects on the human body. Not only is it associated with photo-ageing, but prolonged UV exposure is responsible for significantly reducing the number of nerve fibers in the skin. Both sympathetic and sensory innervation in the skin originate from post-ganglionic sympathetic neurons and neurons in the dorsal root ganglia. Damage to these nerves is associated with sensorimotor neuropathy, diabetic neuropathy, and neuritis. In order to combat this observation, B. L. Fonseca and a team of researchers developed a formulation from *Echinacea purpurea*. They used *E. purpurea* extract enriched with antioxidants to evaluate its protective effects against UV irradiation (*ex vivo*). Skin samples were treated and exposed to UVA and UVB. Results indicated that nerve densities in the placebo group significantly reduced in number whereas samples treated with the test emulsion completely blocked UV related effects

05.03.35 Antidiabetic Effect of Transgenic and Wildtype Safflowers

Noor Ahmed,

Northeastern State University

Safflower, an agricultural crop grown for thousands of years, has been utilized in Iranian traditional medicine for the treatment of diabetes. A transgenic strain of the *Carthamus tinctorius* plant was recently developed to produce human insulin for diabetic patients. Insulin is usually obtained from the pancreas of some animals or harvested from genetically engineered bacteria (*Escherichia coli*) and yeasts (*Saccharomyces cerevisiae*); however, these methods of insulin production are expensive and demand for this biopharmaceutical is high and expected to sharply increase. Transgenic safflowers, which can efficiently produce a higher supply of insulin at a lower cost, have the capability for meeting the climbing demand for insulin. In the study of non-transgenic safflowers, hydroalcoholic extract was isolated and used to treat diabetically induced rats to determine if it had any anti-diabetic effect. In the study of transgenic safflowers, the human insulin gene was inserted, inducing the plants to produce insulin, which was then harvested by grinding the seeds and extracting the oil.

05.03.36 Investigation of differential habitat use by lizards in the Wichita Mountains

Jetta Trammell, Matthew Van Sant,

Cameron University

Previous work has shown the prairie lizard *Sceloporus consobrinus* and collared lizard *Crotaphytus collaris* prefer different microhabitats within the Wichita Mountains. These two lizard species might prefer different optimal temperatures. Alternatively, *Sceloporus consobrinus* may be selecting a habitat away from *Crotaphytus collaris* to avoid predation. Even though lizards are ectothermic organisms, they do thermoregulate using behavioral means and careful microhabitat selection to maintain a preferred body temperature. The body temperature of lizards is influenced by factors including air temperature, wind speed, solar radiation, conduction and organismal anatomy. Operative temperature is a thermal parameter that accounts for all of these factors. We have obtained life-sized copper lizard models and will use them as operative temperature thermometers to create a thermal map of the environment and predict which microhabitats lizards should use based on their thermal preferences. This will allow us to compare our data with previously collected data in order to describe patterns of microhabitat use of prairie lizards and collared lizards. We will use this data to test whether microhabitat selection in *Sceloporus consobrinus* and *Crotaphytus collaris* is due to differences in thermal preferences or due to an alternative hypothesis, such as predator avoidance.

05.03.37 Influence of historic coffee cultivation on terrestrial snail communities in the Luquillo Experimental Forest, Puerto Rico

Craig Zimmermann, Nadia Kyrlyova, Renee Morse-Heenan,

Rogers State University

This study investigated the influence of historic coffee cultivation on snail communities in the Luquillo Forest, Puerto Rico. Snails were surveyed in an area known to farm coffee until 1928. Snails were sampled during three summers along transects running across to plantation lines. Each transect consisted of 10 plots with 5 plots in old coffee and 5 plots in adjacent undisturbed forest. Though no difference in species richness or diversity was found between land uses, overall snail abundance was higher on the old coffee. Two common snails, *Caracolus caracolla* and *Nenia tridens* were 2-5x more abundant on old coffee. *C. caracolla* on old coffee also had more juveniles. Land use factors may explain these differences. Previous floristic surveys found distinct differences in tree composition and soil properties between land uses types. Soils calcium, nitrogen, and pH were also elevated in old coffee. Limestone, applied to coffee fields to raise pH, is still present and would provide calcium needed by snails for shell growth. Higher pH would hasten litter decomposition and increase available food for detritivorous snails. Higher soil N likely arose from *Inga vera* trees planted to shade coffee plants. Higher soil fertility would promote faster forest growth and greater litter production. Increased detrital inputs coupled with faster decomposition would enhance snail habitat.

05.03.38 The Five Second Rule

Eric Paul, Candace Fairman,

Southwestern Oklahoma State University

This research project was conducted in effort to validate the "five second rule". A common superstition, the five-second rule states that food dropped on the ground will not be contaminated with bacteria if it is picked up within five seconds of being dropped. We tested different food items: organic and inorganic, salty and sweet, and wet and dry foods. Each food item was swabbed before the experiment to determine its microbial load. We then proceeded to drop the various food items on to artificially contaminated microbe area (tile, carpet, counter, etc.) for varying time periods. The food item was again surveyed for microbial contamination after the drop. The experiments were conducted multiple times. The results of the pre-drop and the post drop swabs indicate that there was no significant difference in the bacterial load between food picked up after five seconds and the food picked up in less than five seconds. These experiments suggest that dropping an item of food on to a surface for less than five seconds, will result in contamination. We used *E. coli* and *S. aureus* as experimental microbes. We are currently working on a double dip experiment.

05.03.39 Staphylococcus aureus and Methicillin-Resistant S. aureus Among Student Athletes and Non-Athlete Students

Eric Paul, Matt Abbott,

Southwestern Oklahoma State University

Staphylococcus aureus is a microbe prevalent in the nose and on the skin of approximately 1/3 of the human population. The microbe remains benign on the surface of the skin, but when it gets under the skin through an open wound, *S. aureus* can cause life threatening infections. The most prevalent danger of *S. aureus* is the resistance it has developed to certain antibiotics, mainly to the drug class of penicillin. The most common antibiotic resistant strain of *S. aureus* is the Methicillin-Resistant *Staphylococcus aureus* (MRSA). Our focus is to compare MRSA carriers among athletes and non-athlete populations. Athletes are highly susceptible to becoming infected with MRSA because they: have much more skin-to-skin contact than most other people, typically have more abrasions than others, and share personal items more often. Our results show that the athlete population has a higher numbers of carriers than the non-athlete population using tests that include Mannitol Salt Agar test, Tellurite Agar, Coagulase, and Mueller-Hinton with an Oxacillin disc.

05.03.40 Sandwich ELISA Optimization

Leila Ndomche Kondo,

Oklahoma City Community College

The Enzyme-linked immunosorbent assay (ELISA) is a popular diagnostic tool to detect or quantify a protein in a liquid sample. Performing a sandwich ELISA involves two antibodies with specificity for the very same protein. Common incidences observed in sandwich ELISA procedures are often low signals, low sensitivity, high background signal due to high amount of enzyme conjugate and poor standard curve linearity and dynamic range (1). To avoid these occurrences, critical parameters of sandwich ELISA procedures must be optimized in order to obtain a reliable assay. The purpose of this study was to create a standard operating procedure (SOP) for the quantitative determination of soluble Human Leukocyte Antigen (sHLA) molecules in production crudes as well as measure activity levels in a quality control assay. The four major parameters of the assay were identified and independently evaluated. Parameter 1: the optimal coating concentration for the capture antibody W6/32 was found to be 15 µg/ml which may vary for different lots. Parameter 2: sHLA concentrations of a standard sample covering the dynamic range of the assay were chosen from 5 to 600 ng/ml. Parameter 3: the biotinylated detection antibody dilution factor was selected to be most adequate at a 500-fold dilution. Finally, Parameter 4: the enzyme-substrate (horseradish peroxidase and o-phenylenediamine dihydrochloride) development timing was chosen at 15 minutes bringing the maximum signal well below saturation.

05.03.41 Conservation Triage and Sonoran Mud Turtles in the Peloncillo Mountains of New Mexico

Chelsea Smith, Paul Stone,

University of Central Oklahoma

Conservation triage is a method for allocating resources to obtain the largest conservation impact. Advocates of this approach recommend concentrating resources on situations where there are serious threats but also a high probability of recovery if action is taken. However, current environmental policy and funding priorities remain focused on critically endangered species. By taking a small fraction of resources devoted to endangered species and diverting them to less extreme problems, we could perhaps reduce matriculation of vulnerable and threatened species into the endangered ranks. Sonoran Mud Turtles (*Kinosternon sonoriense*), listed as Near Threatened by the IUCN, are ideal candidates for conservation triage. In the Peloncillo Mountains, large populations are associated with small impoundments constructed during the New Deal. Many impoundments are failing due to siltation or dam failures, which likely threatens otherwise thriving turtle populations. We began calling attention to this problem in 2008. Neither the landowner (USFS) nor funding agencies (including TCF) could allocate resources to restoring these habitats because the problem was not considered sufficiently grave to warrant attention. During 14-28 May 2012, a group of biologists, ranchers, and private citizens began restoration efforts at two impoundments. This poster is a presentation depicting those efforts.

05.03.42 Buffer Manufacturing

Alayna Trujillo,

Oklahoma City Community College

Cytovance Biologics is a biopharmaceutical contract manufacturing company specializing in the production of therapeutic proteins and antibodies from both mammalian cell culture and microbial fermentation. When manufacturing buffers for the downstream process, adherence to good manufacturing protocols is mandatory to ensure product integrity. This project describes the process of buffer manufacturing in a GMP facility.

05.03.43 Harvesting Foreign Chloroplasts for Acquired Phototrophy

Stephen Fields, Angie Thapa, Brent Bidy, Josh Belcher, Sadiksha Khadka, Taryn Young,

East Central University

Gymnodinium acidotum is a nonphotosynthetic, aplastidic dinoflagellate that ingests and sequesters the organelles of blue-green cryptophycean algae. The sequestered cryptophycean chloroplasts remain photosynthetically active and actually support the dinoflagellate cells in an obligate symbiosis. Other sequestered cryptophycean organelles, including the nucleus and nucleomorph (a reduced nucleus-like structure), presumably play a role in maintaining the sequestered chloroplasts. We are currently sequencing and analyzing the transcriptome of the free-living cryptomonad and have found gene expression patterns (including nucleomorph genes) common to most eukaryotic metabolic pathways. Future studies will compare the transcriptome of free-living cryptomonads with that of dinoflagellate-sequestered cryptomonad organelles. This will aid in identifying genes that are important for the maintenance of chloroplasts in a foreign environment. We have also found that free living cryptomonads show an enhanced growth rate when cultured in the presence of supernatants from *G. acidotum* cultures. This raises the possibility that *G. acidotum* secretes stimulatory compounds for the purpose of "harvesting" cryptomonads. Specific fractions from the dinoflagellate cultures, obtained by HPLC, significantly increase cryptomonad growth. Compounds that enhance algal growth would directly impact the phyculture technology currently used in biofuels production, improving both efficiency and yield

05.03.44 A Review of Genetically Engineered Food

Dillon Cave,

Northeastern State University

Genetically-modified food have had genes altered or replaced. Genes code for proteins to be produced by the plant for many functions. Scientists can manipulate genes to gain all the positives, while expelling any negatives. Genes that provide insect and disease resistance can be incorporated into the plants genome. By genetically modifying food, scientists can provide farmers reassurance when it comes to protection, health and boosting high yields for their crops.

05.03.45 Are Students Experiencing Transformative Learning?

Alexandria Assaleh, Cynthia Murray, Ryan Biggerstaff, Sarah Schatz, Tracy Morris,

University of Central Oklahoma

Project SCHOLAR (Statistical Consulting Help for Organizational Leaders and Academic Researchers) is a student statistical consulting service at the University of Central Oklahoma (UCO). SCHOLAR students work under the supervision of faculty from the department of mathematics and statistics on various projects submitted from other researchers. SCHOLAR students were asked to analyze data collected from the Graduating Student Survey (GSS). Every year, students who apply for graduation at UCO complete this survey. The members of Project SCHOLAR focused their studies on the questions pertaining to Transformative Learning experiences. Through the Transformative Learning tenets, UCO aims to provide a unique learning experience for students who attend the university. These tenets are Discipline Knowledge, Leadership, Problem-Solving, Service Learning and Civic Engagement, Global and Cultural Competencies, and Health and Wellness. We are interested in the impact of these tenets on the student's overall college experience since their implementation in 2007. We present a statistical analysis of the differences over five years with respect to items concerning the six tenets. We also examined the National Survey of Student Engagement (NSSE) completed by UCO students in 2009 and 2012. Again, only those questions related to the six tenets were analyzed, and those results were compared with the results from the GSS.

05.03.46 Moxibustion

Cale Fulps,

Northeastern State University

Traditional Chinese Medicine is very different from the Western Medicine to which the people in the United States are accustomed. Some of the techniques implemented are herbal medicine and acupuncture. There is also a technique that is a mixture of both herbal medicine and acupuncture called moxibustion. Moxibustion is done by placing a spongy herb called mugwort, or wormwood, on acupuncture points on the body and setting the herb on fire. There are two different methods of moxibustion: direct and indirect. In direct moxibustion, the mugwort is allowed to touch the skin. In indirect moxibustion, the burning mugwort is held near the skin without touching the skin. The mugwort is supposed to promote blood flow in the body. There are no hard results proving that moxibustion is the cure of any sickness or disease, but many ongoing studies are taking place.

05.03.47 Transcriptome analysis of oxygen sensing in the model organism Dictyostelium

Muatasem Ubeidat, Christopher West,

Southwestern Oklahoma State University

Dictyostelium discoideum is a powerful biomedical model organism to study developmental regulation and cellular signaling because of the ease of molecular genetics, biochemical and cell biology approaches. The developmental process of this organism depends on environmental and internal signals and can be divided into two phases; the formation of a moving slug from solitary amoeba upon starvation and the switch from a slug to fruiting body that holds the spores, for dispersal, on an aerial stalk. The slug-to-fruiting body switch (culmination) is regulated by ammonia, O₂, light and other factors, possibly acting via prestalk tip cells. Studies suggested that at least ten genes are involved in transducing the signal to allow the slugs to culminate and form a fruiting body. In this study, we seek to sequence RNA in an approach to transcriptome profiling. Ax3 strain will undergo development at 21%, 12% and 5% oxygen. Total RNA will be isolated from different stages of Dictyostelium development. Poly A-RNA will be then converted to a cDNA library using adaptors attached to one or both ends. Each molecule will be sequenced using the latest sequencing technology. The resulting millions of reads will be aligned to the Dictyostelium genome and a transcription map for each condition or a stage will be created and compared. We anticipate at least 10 genes to be characterized using this approach.

05.03.48 A Review on The Discovery of Dendritic Cells

Miranda Anderson,

Northeastern State University

Dendritic cells are the key accessory cell used by the mammalian adaptive immune system . Their main function being to recognize antigenic material and present it to the surface of lymphocytes. In 1978 Steinman began his research by purifying dendritic cell from mice spleens. This along with mixed leukocyte reaction testing lead Steinman to first propose the idea, of dendritic cells as the accessory cell for adaptive immunity. Steinman and his team proved the importance and existence of dendritic cells. Upon this proof, opportunities for further research became endless for medicine.

05.03.49 Molecular Coordination of Iron Homeostasis by microRNAs

McKale Davis, Brenda Smith, Edralin Lucas, Elizabeth Rendina, Grant Tinsley, Ramanjula Sunkar, Stephen Clarke, Yun Zheng,

Oklahoma State University

Iron is an essential nutrient critical for oxygen transport, DNA synthesis, ATP generation, and cellular proliferation. At the molecular level, iron deficiency (ID) elicits a cascade of cellular events aimed at conserving iron for the maintenance of these life-preserving functions, but tissue-specific responses and metabolic adaptations to ID are not fully understood. Recently, small regulatory RNA molecules called miRNAs have been identified as an important mechanism for regulating various cellular processes. Therefore, we sought to determine the extent to which expression of miRNA is regulated in response to dietary ID and to examine their potential regulatory capacity in the adaptive response to ID. To do this, we first characterized the expression of miRNA in the livers of iron-sufficient and iron-deficient animals using a deep-sequencing approach. Results compiled from three different analyses indicate that at least ten miRNAs are differentially expressed in the liver of ID rats. Further bioinformatic analyses showed that at least two of these miRNA have predicted targets directly involved in maintenance of iron homeostasis or the metabolic adaptations to iron deficiency. Ongoing studies include in vitro validation of predicted miRNA targets using luciferase-reporter assays, and miRNA gain/loss of function analyses on the impact of cellular iron metabolism.

05.03.50 Senescence Marker Expression Differs Among Foragers Classified by Blue-Yellow Color Preference and Reward-Responsiveness

J.M. Hranitz, H. Wells, Ibrahim Cakmak, John Barthell, Jonathan Bobek, Leah Bates-Albers, Meredith Clement, Nora Hall, Talei Apted,

Bloomsburg University, University of Central Oklahoma, American Samoa University, Loyola Marymount University, Uludag University, University of Tulsa

Many bees exhibit flower constancy during foraging, to which the relative contributions of learning and genetics are a highly active area of research. Naive honey bee foragers differ in blue and yellow flower color preference, suggesting a genetic basis to foraging behavior. Conversely, bees also alter preferences to maximize nectar or pollen rewards. We hypothesized that gene expression affects color preference of foraging honey bees. During June-July 2010 at Uludag University (Republic of Turkey), we monitored foraging during a 60-minute behavioral assay to categorize foraging patterns of free-flying Anatolian honey bees (*Apis mellifera anatolica*). Bees selected from alternative reward conditions, high reward quality versus low reward quality, randomized in blue and yellow artificial flowers. Blue or yellow "constant" bees rarely visited opposing color flowers, while "reward-responsive" bees readily switched to the higher reward flower quality. We compared brain mRNA of Blue Constant (BCF), Yellow Constant (YCF), Reward-Responsive (RRF) foragers on Agilent bee arrays, using a one-way ANOVA with pairwise contrasts. Only regucalcin-like protein differed between groups ($F = 30.395$, $p = 0.002$), with two-fold lower expression in YCF versus RRF and BCF bees. Since regucalcin is linked to aging in animals, flower color choice and responsiveness to floral rewards by foraging honey bees in this study appears affected by age and environmental factors.

05.03.51 Review - Tunneling Nanotubes: Intercellular Communication, Cytoplasmic Sharing, and Pathogen Pathway

Don Curry,

Northeastern State University

Intercellular communication is of paramount importance in multicellular organisms. The best known communication routes for intercellular communication are cell-signaling through the secretion of molecules that bind to specific receptors via paracrine or endocrine pathways, molecular transfer through gap junctions, and the secretion and fusion of exosomes. Recently, Rustom et al. published information about a novel, unidirectional communication mechanism that utilizes de novo thin, 50-200nm diameter tubes spanning up to several cell diameters, that connected cells found in cultured rat pheochromocytoma (PC12) cells. Initially, the tubes, noted in vitro, were transitory. Since then, tunneling nanotubes (TNTs) have been identified in many cell types, have been shown to exist for several hours, are found to connect individual and sometimes large complexes of cells, have been found to share cellular molecules and components, including membrane organelles such as mitochondria, carry electrical signals, and have been shown to be a pathway for prion, viral, and bacterial infection. This review looks at some of the myriad research and findings of this fascinating mechanism.

05.03.58 CURE-STEM: A Model for Encouraging and Sustaining a Culture of Student-Centered Research

Charlotte Simmons, Beverly Endicott, Charles Hughes, Gregory Wilson, John Barthell, Wei Chen, William Radke,

University of Central Oklahoma

We describe characteristics of a model for encouraging faculty development and student learning through undergraduate research practices at a publicly funded predominantly undergraduate institution. The Center for Undergraduate Research and Education in Science, Technology, Engineering and Mathematics, or CURE-STEM, incorporates best practices from a now burgeoning literature on undergraduate research and has yielded a positive fiscal return on investment in faculty members who support student-centered research activities.

05.03.59 Globalization, Undergraduate Research, and Persistence to Graduate School

John Barthell, Charles Abramson, H. Wells, J.M. Hranitz, J.R. Redd, William Radke,

University of Central Oklahoma

Kuh's introduction of High-Impact Educational Practices (2008) has encouraged a nation-wide convergence of efforts to align institutional missions with best practices in higher education in order to increase persistence by students toward their career goals. However, achieving the alignment with the effective collaboration of administration, faculty, and students can be challenging during the implementation process. We detail a seven-year process of incorporating experiential learning activities, termed Transformative Learning, into the university mainstream, citing an example of the integration of global competency activities with an international research program.

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

Lindsay Stone,

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 successfully 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.

05.03.61 Proliferation of Myofibroblasts using 5-ethynyl-2'-deoxyuridine (EdU)

Tobi Odejimi, Julie Hamilton, Melville Vaughan,

University of Central Oklahoma

The purpose of this experiment was to test 5-ethynyl-2'-deoxyuridine's effectiveness in immunofluorescently labeling myofibroblasts. 5-ethynyl-2'-deoxyuridine (EdU) is a unique nucleotide that binds to DNA during S phase of cell cycle in DNA replication. This will be accomplished by treating different carpal tunnel cells: CT4HTERT, CT4 young, and CT4 old cells with EdU to identify if the DNA replicated. These are normal adult fibroblasts cells that have been surgically removed from patients. The reason fibroblasts are being used is because fibroblasts synthesize extra cellular matrix and collagen in animal tissues. When a person incurs a wound fibroblasts are signaled to approach the wound, proliferate, and differentiate in order to help close the wound close. Fibroblasts differentiate to form cells called myofibroblasts, which express alpha-smooth muscle actin, which greatly aids the contraction of wounds (Vaughan et al., 2000). Previous research has shown that myofibroblasts most likely do proliferate to a small degree and that transcription growth factor beta affects the amount of proliferative myofibroblasts present. In this experiment we accomplished understanding how the amount of time given to let the EdU bind to the DNA affects the experiment and adjusted the current EdU assay accordingly to make it more effective for studying fibroblasts and myofibroblasts.

05.03.62 Quantitation of Total Human and Human Male DNA Using Real-Time PCR

Lyndsey McNeil,

Oklahoma City Community College

The Plexor® HY System is a system designed to simultaneously quantitate total human and human male DNAs utilizing a real-time PCR system. The use of PCR primers labeled with quenchers and fluorescent dyes allow this to occur. A series of assays were ran under conditions specified by the manufacturer, and analyzed using the Plexor® Analysis Software. The objective of this study was to determine the amount of human autosomal and Y DNA within a sample using the kit provided by Promega. The Plexor® HY System uses modified nucleotides to accomplish quantitative PCR Analysis. One of the two primers contains the nucleotide iso-dC, tagged with a fluorescent label. This primer is located on the 5' end. The reaction mix contains Dabcyl-iso-dGTP and deoxynucleotides. Dabcyl is a weak quencher that is integrated opposite the iso primer during the annealing and extension process. Dabcyl-iso-dGTP executes the quenching of the fluorescent tag on iso-dC, which is located on the complementary strand. Measuring the amount of fluorescence allows quantitation during the while amplification process.

05.03.64 Plant Competition and Perturbation within an Aegean Pollination System

John Barthell, A.M. Chicas-Mosier, C.A. Hayes, C.W. Dinges, H. Wells, J.M. Hranitz, J.R. Redd, K.M. Rivera-Vega, M.I. Williams, T. Petanidou, T.N. Brewster,

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Flowering plants use nectar and other rewards to compete with one another for pollinators. The ability to consistently attract bees, for example, is often mediated by nectar standing crop levels within and between species. Yellow star-thistle, *Centaurea solstitialis*, effectively competes for honey bees and other such pollinators in the western USA where it produces relatively high nectar standing crops. In its native range, including in the Republic of Turkey and Greece, however, honey bees are less common at flowers. We used a perturbation experiment to explore this phenomenon, by recording visitation rates of flying Hymenoptera (bees, wasps, etc.) observed in plots of *C. solstitialis* on the Northeast Aegean Island of Lesbos, Greece. We did so by introducing flowers of its sympatric competitor, chasteberry or *Vitex agnus-castus* into transects of *C. solstitialis*. The results demonstrate that even a short-term introduction of *V. agnus-castus* (with high average standing crop nectar volumes) will disrupt visitation patterns of pollinators to *C. solstitialis*. This effect suggests that the range expansion of newly introduced flowering plant species, especially those requiring outcrossing such as *C. solstitialis*, may be directly related to the competitive landscape these species encounter upon arriving in new environments, or just being lucky.

05.03.65 Plant Biotechnology

Mohammed Shaban, Kevin Wang,

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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 ("What is Biotechnology"). 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 Biotechnology"). 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 (Thieman 159).

05.03.66 Pollinator Type and Size Varies According to Nectar Standing Crop within American and Eurasian Island Ecosystems

John Barthell, H. Wells, J.M. Hranitz, J.R. Redd, T. Petanidou, Victor Gonzalez,

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The response of pollinators to nectar rewards by plants can correlate with variables such as body size within species and morphological and behavioral differences among species. We tested for a relationship between body size of bee pollinators and nectar standing crop levels in populations of the highly invasive plant species yellow star-thistle or *Centaurea solstitialis*. Our findings show significant differences in average bee body size as sampled from plots of *C. solstitialis* with differing average nectar standing crop levels. Large-bodied bees visited plots with relatively high standing crops more often than small-bodied bees, a finding that is consistent within and between the island ecosystems where the plant is native and non-native: Lesvos (a Northeast Aegean Island in Greece) and Santa Cruz Island (among the Channel Islands in the USA), respectively. Taxonomically, honey bees show a preference for high nectar standing crop plots as do other large-bodied species in the family Apidae; small-bodied solitary bees in the families Megachilidae and Halictidae are more common in low nectar standing crop plots. These observations are reviewed in the context of plant competition with implications for biological invasion.

05.03.67 Impact of Hand Washing Instructions on Hand Washing Practices at the University of Central Oklahoma.

Robert Brennan, Allison Coleman, Amber Bragg, Brendon Yuill, Chelsea Smith, Emily Shackelford, Jayci Fleming, Jing Herwig, Joseph Proffer, Kalen Cesar, Khabbab Amin, Mike Braden, Peter Drevets, Quinn Gorges, Shey Ramsey, Veronica Smith,

University of Central Oklahoma

Washing hands with soap and water has long been considered an effective way to reduce the spread of infectious disease, yet hand washing compliance has historically been low, even in health care institutions. Studies conducted in health care institutions have shown that compliance can be improved with intervention, principally through the potential for punishment. In a public setting, the threat of punishment is not a viable option; therefore other methods are employed to promote hand washing compliance. The hypothesis was that placing instructions in the rest rooms would significantly improve hand washing practices on the UCO campus. Over a period of two months students from the course observed hand washing practices in various restrooms on the UCO campus before and after hand washing instructions were placed in the restrooms. The percentage of subjects who washed their hands according to the Center for Disease Control (CDC) recommendations improved from 23% to 27% after hand washing instructions were placed in designated restrooms. This improvement was not statistically significant and indicates that placing signs in restrooms is not sufficient to improve hand washing practices on the UCO campus. This study was carried out as part of an active learning exercise in a Microbiology for Majors course in the fall of 2012 after students had completed the NIH training for Protecting Human Research Participants and under IRB approval.

05.03.68 Optimization of Protocol for Histidine-Tag Specific Capture for Standard Biosensor Surface

Jordan Evans, Skylar Snowden,

University of Central Oklahoma

Presented here is the optimization of the solid state linkage of a chelating agent for the reversible immobilization of a poly-histidine tagged protein using the SensiQ Pioneer SPR (surface plasmon resonance) biosensor. NTA ligand [$N\alpha$, $N\alpha$ -Bis(carboxymethyl)- L-Lysine hydrate] was covalently linked to carboxymethylated dextran on the biosensor chip and treated with Ni^{2+} prior to injection of a hexa-histidine peptide and a his-tagged protein. Various conditions were tested to optimize both the linkage of NTA to the surface and of peptide/protein capture amounts, including: pH, buffer components, NTA concentration, surface activation contact time, and wash conditions. Each condition exerted some influence on the covalent attachment of NTA to the dextran surface, with the most potent conditions being activation contact time and pH of the NTA solution. Peptide/protein capture response was positively correlated to the amount of active NTA ligand conjugated to the dextran surface. An optimized protocol for the construction of a stable and repeatable chelating agent for his-tagged protein immobilization was established, thus enhancing a methodology of biomolecular interaction analysis for SPR biosensors.

05.03.69 The Effects of Freeze-Dried Watermelon on Bone Parameters of Ovariectomized Mice

Maryam Mahmood, Brenda Smith, Connie Ketz-Riley, Edralin Lucas, Heba Eldoumi, Kayla Castleberry, Maureen Meister, Penelope Perkins-Veazie, Stephen Clarke,

Oklahoma State University

The role of fruits and vegetables in the prevention and treatment of chronic diseases such as osteoporosis are continuously being explored. The purpose of this study was to investigate the dose-dependent effects of freeze-dried watermelon in the prevention of bone loss in ovariectomized (ovx) mice, a model of postmenopausal osteoporosis. We hypothesized that compounds in watermelon such as lycopene and citrulline would help prevent bone loss in ovariectomized mice. Three month old C57BL/6 female mice (n=68) were sham-operated or ovx and randomly assigned to six treatment groups for 12 weeks: sham-control, ovx-control, ovx + 1%, 10% or 25% (w/w) freeze-dried watermelon (WM), or ovx-control with alendronate injection (100 ug/kg body weight). All diets were isocaloric, isonitrogenous and had the same calcium and phosphorus concentrations. The 25% WM group had significantly higher final body weight and % body fat compared to the ovx-control group. Additionally, watermelon was not able to prevent the decrease in whole body and tibial bone mineral content due to ovariectomy. Our preliminary data indicates that watermelon might not be a suitable dietary option for preventing post-menopausal osteoporosis.

05.03.70 Eastern Medicine: Acupuncture

Ahmed Zendah,

Northeastern State University

Eastern medicine is almost a widely accepted form of treatment and is popular with people of the western world today. Specifically, traditional Chinese medicine is one of the most common practices used in the United States. Chinese medicine concepts have been formulated and practiced for over 2,000 years, several forms of these medical practices include acupuncture, herbal medicine, and simple massage. Acupuncture treats patients by using small, thin needles and inserting them into stimulating points on the human body. There are studies that reveal that some acupuncture treatments help with some musculoskeletal conditions and pain, however, other studies say this form of treatment is nothing more than a placebo effect on humans, acupuncture is an ongoing controversial subject.

05.03.71 Foraging Strategies in the North American Honey Bee (*Apis mellifera*): Forensic Applications and Analyses

JeAnna Redd, Alexa Prim, Alexia Gonzalez, Emily Webb, Jessica Price, John Barthell, Jordyn Vargas, Michael Jordan, Thomas Jourdan, Wayne Lord, Yoselin Vallejos,

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 those odor detectors can be redirected from floral attractants to carrion. Cinnamon scent was used as a control and S-methylthiolacetate was used as the treatment carrion odor. For each odor, bees were trained by exposure to the scent in the mouth of the hive for one to two days prior to experimentation. Three feeding stations were set up equidistant from the hives and each other. Two of the feeders consisted of a 1.5M sucrose solution and scent was added to the third feeder with sucrose solution. Within 15 minute intervals, the number of bees feeding at each station was tallied. Upon conclusion of the timed intervals, 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. For both odors, the bees showed a trend of visiting the feeder containing the scent with which they were trained. This study has far reaching forensic/economic implications. Within forensic science, animals have long been used to detect carrion. However, none have been as inexpensive and as easy to train as honeybees have the potential to be. Training honey bees to detect carrion would alleviate much of the time, cost, and energy required to train other animals.

05.03.72 A Look at Eastern Medecine

Rebecca Wagner,

Northeastern State University

Eastern medicine is rooted deep in tradition, dating as far back as the Shang Dynasty. This type of healing takes a more introspective and holistic look at treating the person for ailments of all types. A great deal of focus is placed on treating the whole person, which includes the mind, body, and the spirit. Different therapies are used to treat anything from cancer to a common headache. While there is a common belief framework consistently present throughout Eastern Medecine, there are many subtypes that sometimes use differing medical theories. The exact philosophies and techniques used can vary greatly. Overall, Eastern philosophies fall in line with working with the earth and the environment to promote a greater good for both. The people utilize the earth for healing. Traditional Chinese Medecine includes herbal medicine, massage (Tunia), and acupuncture. Chinese Herbal Medecine diagnoses and treats based on the theories of Traditional Chinese Medecine. Acupuncture is based on using the body's natural meridians and stimulation of these points. Tunia, or massage, is a subcategory of body work, and focuses on releasing tension and blockages in the body. Tunia is typically used in conjunction with acupuncture to yield maximum positive results.

05.03.73 Altered TNF-Alpha And IL-10 Cytokines In Bladder And Kidney Of Mice With Increased Uropathogenesis

Sepideh Darbandi, Anil Kaul, Rashmi Kaul, Richard Glass,

Oklahoma State University

Introduction: Proinflammatory TNF α and anti-inflammatory Interleukin (IL)-10 cytokines play an important role in innate immune responses during uropathogenesis. Early cytokine activation events that occur in the bladder immediately following urinary tract infection (UTI) are poorly understood. Evidence from our lab shows that estrogen and estrogen receptor alpha deficiency are important susceptibility factors in UTI pathogenesis as observed in estrogen receptor alpha (ER α) gene knock-out (KO) mice. We hypothesize that ER alpha disruption alters TNF α and IL-10 induction in the bladder contributing to adverse UTI outcome. We studied the kinetics of TNF α and IL-10 in the bladder and kidney of ER α KO and wild-type (WT) mice at 2 and 7 days post UTI by Dr E. coli. Methods: Protein immunohistochemistry was performed in paraffin embedded kidney and bladder tissue sections from infected mice using HRP-DAB system. Results: TNF α was predominantly seen in the cells of transitional epithelium of the bladder and IL-10 expression was found in both bladder smooth muscles and uroepithelium. ER α KO mice showed delayed induction of proinflammatory cytokine TNF α , but increased anti-inflammatory IL-10 production in both bladder and kidney at the early time point resulting in adverse UTI outcome in these mice. Conclusions: Timely induction of both TNF α and IL-10 at the early onset of UTI is crucial. Therapeutic modulation of TNF α and IL-10 may se

05.03.74 Increasing the precision of measurements for tension generation by precancerous cells, Ker-CT-Ras,

Jessica Webb, Anna Graves, Melville Vaughan,

University of Central Oklahoma

Recent research activity has focused on the tumor stroma, the microenvironment surrounding cancers. Tumor stromas are typically connective tissues containing fibroblasts and myofibroblasts, cells that are elsewhere required for wound healing responses. There is evidence that myofibroblast presence in tumor stromas leads to poor prognosis. Factors that enhance differentiation of myofibroblasts include TGF- β , ED-A fibronectin, and mechanical tension. Our study focuses on the ability of Ker-CT-Ras to generate tension in a dermis-like environment and compares that ability when the cells are treated with TGF- β . This study used Grinnell's stress relaxation collagen matrix model, a model that acts like a wounded dermis; that is, it provides the necessary microenvironment for myofibroblasts. Its use is mostly for looking into the properties of fibroblasts, cells native to the dermis. Our lab has also taken to using it in the research of invasive cells, called Ker-CT-Ras. The release method for these cells is more tasking. Ker-CT-Ras lattices have higher occurrence of wrinkling and folding. In this study, I look for an optimal day for release of lattices with half the cell concentration previously used.

05.03.75 Molecular Pharming with Transgenic Plants

Zach Zaaza,

Northeastern State University

The field of molecular pharming is a vastly growing field in terms of research and popularity. Molecular pharming is a breakthrough because it allows researchers to develop affordable medicines with easy availability for the rest of the world, primarily in under-developed countries where the acquisition of medicine and medical treatment is rare. Researchers at St. George Medical School Hospital in London are working feverishly to find different ways to develop these medicines and vaccinations to provide to those parts of the world. In this presentation, we will discuss the current progress that has been made in the field of molecular pharming with transgenic plants, and the research that will be conducted in the future.

05.03.76 The Study of Azoreductase Enzymes in Human Intestinal Bacteria

Taylor Dismuke, Shanel Byron, K.J. Abraham,

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 *Enterobacter aerogenes* and *Sarcina aurantiaca* and isolate the azoreductase gene coding for the enzyme. Genomic DNA was extracted from both *E. aerogenes* and *S. aurantiaca* 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.

05.03.77 The Further Study of n-Acetyl Cysteine (NAC) Effects on Cell Proliferation and Phenotype

Jing Herwig, Melville Vaughan,

University of Central Oklahoma

Antioxidants such as NAC are shown to reduce the contractile properties of fibroblasts. Fibroblasts are found in most pathological contracture diseases and play an important role in wound healing. Many studies have reported that NAC decreases fibroblast differentiation into myofibroblasts in response to transforming growth factor beta (TGF- β). Our recent research studied the effect of NAC on cell proliferation induced by TGF- β . We have already shown that NAC can block the TGF- β effect on fibroblasts and the production alpha-smooth muscle actin in a stress-relaxed collagen lattice model. Furthermore, two distinct cell phenotypes were observed in relation to the amount of tension present. To further study the effect of NAC on cell proliferation and confirm the reversal of NAC on TGF- β effect, we will delay the treatment of NAC after having stimulated the myofibroblast phenotype with TGF- β for 2.5 days. The contraction of fibroblasts will be measured in a stress-relaxed collagen lattice model and the cell proliferation and cell phenotype will be studied on coverslips via the measurement of cells in S-phase with the 5-ethynyl-2'-deoxyuridine (EdU) method. Our results in the collagen lattice model have displayed decreased contraction of fibroblasts.

05.03.78 Hyperglycemia Affects IL-6R Function in Skin

Megsn Bowlin,

Langston University

Non-healing wounds are a significant problem for health professionals. Diabetic wounds appear to be a self-sustaining inflammatory phase. Interestingly, the inflammatory cytokine IL-6 is necessary for wound healing. While it is known that IL-6 is dysregulated in diabetes, little is known concerning the function of IL-6 or its receptor in diabetic wound healing. Gene expression was determined by QPCR, Western blot, or ELISA. ERK ½ phosphorylation was determined by ELISA. L-6 and IL-6 expression are disparately modulated in wounds from diabetic animals. Conversely, neither RAGE mRNA nor protein is induced by RAW cells cultured in low glucose at >1 ng/ml rmlL-6. However, 25 mM glucose exposed RAW cells induce RAGE mRNA and protein less than or greater to 10 ng/ml rmlL-6. In conclusion, Hyperglycemia alters the function of the IL-r while not affecting its expression in skin cells. IL-6 and hyperglycemia can modulate RAGE expression in fibroblast and RAW cells. This interaction may affect IL-6R function in diabetic wounds.

05.03.79 Chinese Cupping Therapy

Kandace Hockett,

Northeastern State University

Cupping is a lesser known form of alternative medicine. The Chinese believed that you have pathways that energy flows through and there is 5 main ones located on the back so this is mainly performed on the back. Its a process of placing glass bulb-like cups that are suctioned to the back. There is two types, wet cupping and fire cupping each giving different benefits. The Chinese believe that cupping can help treat various diseases, increase blood flow and remove toxins to help achieve good chi.

05.03.80 Tensional Homeostasis in an Invitro Wound Healing Model

Chelsea Spencer, Melville Vaughan,

University of Central Oklahoma

In normal wound healing conditions myofibroblasts, contractile cells, are found. During the aging process, healing of wounds is slow which could be from the myofibroblast absence or inability to function. Tension generation is necessary in the healing process; collagen lattices used as an experimental model mimic the environment produced from cells that are under tension in a matrix. My prediction was that tension would be generated all the way to a maximum and then drop back down to match the days before. I used collagen lattice models to test day by day how tension homeostasis changes when given different amounts of time to generate. My results showed that tension reached a maximum after 6 days, then it lessened after that. More experiments will be done to reassure these results. The results from the experiment agree with the predictions made earlier. By understanding tension generation changes using collagen lattice models, we may understand the aging process and how long it could take for the aging generations to heal and also the way that this could occur.

05.03.81 Natural Compounds and Antibacterial Activity in a Species of Mentha

Lindsay Davis, Eliza Payne, Morgan James,

Langston University

Natural compounds from plants are used in medicine every day. Efforts are made to study antibacterial compounds from different sources including plants. The major predominant active chemicals in plants tested were phenolics that showed a great deal of medicinal effect. Past research on antibacterial activity were examined using several different methods and has not been consistent. The objective of this research was to analyze the leaves of a species of Mentha for antimicrobial activity. Mentha plants are also known as mint and are aromatic and grown in wet environmental conditions. The hypothesis is that the compounds from Mentha will exhibit antibacterial activity. Leaves of the plant were dried and extracted with Methyl alcohol using the soxhlet apparatus. Crude methanol extracts were added to culture medium and assayed against Escherichia coli. Though antibacterial activity was not very evident, further tests will have to be done using different solvent extracts. Screening of the compounds will also be followed using chromatographic techniques.

05.03.82 Effect of Transforming Growth Factor Beta Concentration Gradient on Myofibroblast Differentiation

Mellisa Chigwedere, Melville Vaughan, Tobi Odejimi,

University of Central Oklahoma

When a person incurs a wound fibroblasts are signaled to approach the wound, proliferate, and differentiate in order to help close the wound. Fibroblasts differentiate into myofibroblasts. This occurs mainly by mechanical tension and Transforming Growth Factor Beta inducing the cytoskeleton to reorganize itself. It has been shown through research that Transforming Growth Factor Beta 1 promotes the morphological changes and function of myofibroblasts. Transforming Growth Factor Beta is a protein secreted by certain cells that plays a large role in differentiation and proliferation in cells. There have been many experiments using Transforming Growth Factor Beta to induce fibroblast differentiation. In this experiment we plan to investigate what concentration of Transforming Growth Factor Beta is best for experiments with myofibroblasts. The usual dose used in our lab is 1 nanogram per micro liter because this is what has been experimentally found to be low but effective dose. This experiment varied the concentration in order to find if there was a certain concentration that yielded the best results.

05.03.83 Personal Research Review on: Plant Breeding

Mohamad Al-Rifai,

Northeastern State University

Plant breeding, a field of biotechnology, is an optimistic effort in creating ways to progress the production of plants to quantify the amount of food, fuel, and fiber to the limited amount of the worlds sources. Moreover, throughout the years, the population has been growing at an exponential rate; thus, the need for resources is at a direct correlation with the grow, making the needs increase exponentially as well. Therefore, there are a few procedures or techniques done to change, produce, or manipulate certain characteristics in the plants. However, it has been noticed that throughout history, people of different cultures and traditions, have been using methods similar of plant biotechnology to gain their desired results. Crossbreeding and selective breeding are two examples of practices used years ago. Thus, biotechnology is purely an advanced, more scientifically complex method of the older traditions. To further exemplify the similar but more complex methods used by bio technologists, genes of plants are deleted, added or silenced to attain the sought after product. Plant breeding, a growing, complex field, has many advantages to the human population, as well as disadvantages.

05.03.84 Antioxidant Inhibition of Keratinocyte Invasion of a Synthetic Dermis

Attika Secondi, Melville Vaughan,

Rose State College, University of Central Oklahoma

Keratinocytes are skin cells located in the epidermis under normal circumstances; these cells are also involved in nonmelanoma skin cancers. The experiment performed tested the hypothesis that treating with anti-oxidants would decrease the invasion of the Keratinocytes into the more dermal layer. The experiment was set up by creating synthetic wound tissue made with skin fibroblasts and rat tail collagen. The wound samples were incubated allowing the fibroblasts to reorganize the collagen after mixing. Following this the artificial skin tissue was allowed to contract and grow in a submerged environment for 2 days. Then precancerous keratinocytes that are known to invade a setting filled with fibroblasts were placed on top to affix to the wound tissue. Then the tissues were brought to the surface of a culture media by placing in a Transwell insert that allows nourishment from below and (both controlled and treated) were grown like this for two weeks. The tissues were then collected and prepared for sectioning. The sections were stained, viewed and photographed. The stained sections suggested that antioxidant treatment had a positive effect. If given time we can see how the keratinocytes tell the difference between where they are supposed to be (epidermal layer) and where they are supposed to stop (dermis layer) or when the confusion for the cells to differentiate take place. This will be performed using standard staining techniques to identify proteins such as keratin.

05.03.85 Mapping Interaction Domains on Mcm10 and Mrc1 in Budding Yeast

Drew Breedlove, Chance Hendrix, Sapna Das-Bradoo,

Northeastern State University

Minichromosome maintenance protein 10 (Mcm10) is essential for chromosome replication in eukaryotic cells and has been shown to link the helicase activity (Mcm2-7 protein complex) to polymerase activity (DNA polymerase alpha) at the replication forks. All previous studies on Mcm10 implicate its importance in normal DNA replication. Our preliminary studies indicate a novel role of Mcm10 in maintaining genome stability under replication stress conditions. We have observed that Mcm10 interacts very strongly with mediator of replication checkpoint (Mrc1) in budding yeast. Mrc1 functions as a replication fork stabilizer under unperturbed replication and also as a mediator of S-phase checkpoint during replication stress. In order to better understand the role of this interaction, we have mapped the interaction domains on both these proteins. Truncations of Mcm10 and Mrc1 were constructed in yeast two-hybrid vectors. Both proteins were systematically truncated to preserve their conserved domains and interaction was studied using yeast-two hybrid assays. Our results indicate that Mcm10 interacts through its N-terminus while Mrc1 interacts through its conserved C-terminus. These results lead us to believe Mcm10 may possibly function in DNA damage response by interacting with Mrc1 on the replication fork during replication stress.

05.03.86 Using Fluorescence Microscopy to Investigate the Interaction Between Mcm10 and Mrc1 in *Saccharomyces cerevisiae*

Chance Hendrix, Sapna Das-Bradoo,

Northeastern State University

Genomic instability is a hallmark of cancer cells, so there is a continuous search for proteins that are critical for maintenance of genome stability. A previous study has identified minichromosomal maintenance protein 10 (Mcm10) and mediator of replication checkpoint 1 (Mrc1) as two proteins that play an important role in maintaining genome stability. Our laboratory's goal is to further examine the roles of these two proteins as protectors of genomic stability. Mcm10 is an essential part of the replication fork and plays a vital role in fork stability through interactions with proliferating cell nuclear antigen (PCNA), DNA polymerase α and helicase. Mrc1 is involved in the activation of S phase checkpoint and has also been shown to interact with DNA polymerase ϵ . Mcm10 and Mrc1 are highly conserved proteins, so we chose budding yeast, *S. cerevisiae*, as a model organism. We have observed that Mcm10 interacts strongly with Mrc1 using yeast two-hybrid technique. Our next step is to study this interaction by co-localization using fluorescence microscopy. To accomplish this, we have constructed an endogenously tagged Mcm10 (YFP-Mcm10) and Mrc1 (CFP-Mrc1). Currently we are standardizing the protocols for this technique. Our future goal is to study this interaction under normal DNA replication and in the event of DNA damage.

05.03.87 A Review on: Expression Pattern of the Alpha-Kafirin Promoter Coupled with a Signal Peptide from Sorghum bicolor

Catherine Richardson,
Northeastern State University

The increased research investigating the potential of seed-specific promoters as well as the rapid development of reproducible transformation systems has further encouraged the bioengineering of cereal plants for the production of valuable protein products in seeds. The research the the authors have done for this study involved coupling promoters of seed storage α -kafirin genes with signal sequence (ss) and isolating them from Sorghum bicolor L. Moench genomic DNA . For this study, the authors used the α -kafirin promoter (α -kaf) containing the endosperm specificity-determining motifs, prolamin-box, the O2-box 1, CATC, and TATA boxes required for α -kafirin gene expression in sorghum seeds. The constructs pMB-Ubi-gfp and pMB-kaf-gfp were microprojectile bombarded into various sorghum and sweet corn explants. GFP expression was detected on all explants using the Ubi promoter but only in seeds for the α -kaf promoter. This shows that the α -kaf promoter isolated was functional and demonstrated seed-specific GFP expression. The constructs pMBUbi-ss-gfp and pMB-kaf-ss-gfp were also bombarded into the same explants. Detection of GFP expression showed that the signal peptide(SP)::GFP fusion can assemble and fold properly, which preserves the fluorescent properties of GFP.

05.03.88 Drosophila N-Hydro-Terminator

Robert DuPriest,
Northeastern State University

The gene CG10576 is a peptidase that is found in the organism Drosophila Melanogaster but is also reserved in Homo-sapiens, knowing the Drosophila is a model organism and that the gene is a homolog, we can alter the gene in the Drosophila and justifiably assume it will have similar results in humans.

05.03.89 A Review of the Traditional Chinese Medicine Diagnostic Technique of Tongue Inspection

Rachel Wirginis,
Northeastern State University

Traditional Chinese Medicine (TCM) is oriented toward recognizing and correcting imbalances in the flow of bodily energy, or Qi. Acceptance of TCM in the West is growing despite the fact that only a small number of TCM products or methods have been scientifically validated and techniques are not based on Evidence Based Medicine. While Conventional Western Medicine (CWM) relies on experimentation and research to determine practice some proponents of TCM explain that TCM is incommensurable with scientific methods. Many practitioners of CWM have raised concerns about the safety and efficacy of TCM practices. The traditional examination includes four diagnostic methods: inquiry, inspection, auscultation and olfaction, and palpation. Inspection incorporates "tongue diagnosis," an assessment of the tongue and its coating. There are no known studies comprehensively evaluating the clinical diagnostic reliability of the four-part TCM examination, although, some assessments of tongue diagnosis do exist. This poster reviews available published research to address the reliability of tongue inspection and presents possible evidence of the efficacy of this ancient practice.

05.03.90 Treating Retinitis Pigmentosa Through Use of Stem Cell Therapy and Gene Therapy

Rebecca Wagner,

Northeastern State University

Retinitis Pigmentosa is a rare genetic disorder that severely affects vision and afflicts only about 1 in 4,000 people in the United States. This rare retinal disease involves degeneration of retinal photoreceptors, and is known to involve at least 32 genes. The disease first presents in childhood as nightblindness, and progresses to peripheral vision loss in early adulthood with eventual almost total blindness. There is not currently any effective treatment or cure for Retinitis Pigmentosa. Affected patients work with a low vision specialist using adaptive therapy that helps them adjust to living with their vision loss. Researchers are exploring using both stem cell therapy and gene therapy to treat the disease. Gene therapy involves use of a vector to implant genes that correct the genetic defect and works by preventing further deterioration of existing photoreceptors. Stem cell therapy is providing treatment for patients whose retinal cells have already degenerated by providing new, healthy cells in their place.

05.03.91 Desmodus rotundus (Vampire Bat) Salivary Plasminogen Activator as an Alternative Treatment for Ischemic Stroke

Ian Schalo, Frank Yau, Kevin Wang,

Northeastern State University

Someone in the United States suffers a stroke every forty seconds; 85% are ischemic strokes. An ischemic stroke occurs via a clot impeding blood flow to the brain. To treat this dangerous condition, doctors must administer recombinant tissue plasminogen activator (tPA) within 4.5 hours to dissolve the clot and restore blood flow to the brain. Although tPA is effective, it also bears significant neurotoxicity. As such, a more effective approach is sought. Desmodus rotundus salivary plasminogen activator α 1 (DSPA α 1), an anticoagulant in vampire bat saliva, is currently being investigated for its thrombolytic properties. DSPA α 1 is known to antagonize vascular tPA-induced neurotoxicity by competitively binding to low-density lipoprotein related-receptors at the blood-brain barrier. DSPA α 1 is currently undergoing clinical trials. DSPA α 1 shares 345 identical amino acid positions with tPA, with an identity of 61.3%. Though DSPA α 1 is in clinical trials, DSPA α 2 is already being optimized for production in plants. DSPA α 2 shares 427 amino acid positions with DSPA α 1, maintaining a similarity identity of 89.5%. When comparing DSPA α 2 to tPA, 354 amino acids are found to be shared with an identity of 62.87%. Due to the similarity, DSPA α 2 may be an effective thrombolytic agent. The ability to produce this protein in plants could effectively lower the cost and risks associated with current strategies for treatment of ischemic stroke.

05.03.92 The Effect of Telomerase on Dupuytren's Disease Myofibroblasts Migration and Differentiation

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Dupuytren's disease is characterized by shortening of the palmar fascia leading to digital flexion deformity. It is associated with thickening of the tissue underneath the skin. Several studies suggest that mechanical forces in the tissue with TGF- β plays a significant role in the differentiation of the myofibroblasts. Myofibroblasts disappear during scar formation by programmed cell death (apoptosis). The purpose of this study is to determine if hTERT immortalized myofibroblasts from Dupuytren's contracture will differentiate normally in response to TGF- β . The myofibroblast is responsible for the generation of contractile force associated with contraction and characterized by the presence of α -smooth muscle actin (α -sm) and containing stress fibers. Knowledge about the effect of telomerase on human cells may lead to therapies of tissue fibroses and contractures. In this study we used telomerase to immortalize fibroblast derived from Dupuytren's disease (DP147+hTERT) and studied their ability to differentiate into myofibroblasts. DP147 and DP147+hTERT were cultured on coverslips in the presence of TGF- β . Samples of both assays were immunostained with anti-smooth muscle alpha-actin antibody to determine the percentage of myofibroblasts. Telomerase was shown to inhibit the myofibroblast phenotype. Future goal will include comparing original to immortalized cells contractility using stress relaxed collagen lattice

05.03.93 The effect of freeze-dried mango on bone parameters of ovariectomized mice.

Heba Eldoumi, Brenda Smith, Edralin Lucas, Maureen Meister, Stephen Clarke,

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Although pharmaceutical options are available for treatment of osteoporosis, more awareness is being raised on utilizing natural products such as fruits to reduce negative side effects of the currently prescribed drugs. Fruits such as mango are rich in antioxidants, polyphenols, and phytoestrogens which can maintain skeletal health. Previous research has provided evidence of the significant effect of the mango fruit in reducing blood glucose levels and maintaining lipid profile. This study investigated the effects of freeze-dried mango on bone parameters of ovariectomized mice, a model of post-menopausal bone loss. Ninety six, 3-month old CL57/B6 ovariectomized mice were randomly assigned to one of six treatment group for ninety days: a control AIN-93 rodent diet, 1% or 10% mango, mango polyphenol extract (equivalent to the 1% or 10% mango), and alendronate group injected one a week, for 3 months. Bone density and microarchitecture parameters of tibia, and L-4 vertebrae were assessed.

05.03.94 The Kids are Doing Alright: Unexpected High Fitness Payoff of Subordinate Social Tactics in Male Collared Lizards

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Under strong intrasexual selection, males may adopt alternative social tactics to compete for access to females. Because dominant social tactics usually involve more frequent and longer courtship, theory often predicts that dominant males sire more offspring than males displaying subordinate social tactics. However, genetic determination of parentage does not always support this prediction. We combined the social and spatial records of collared lizard females and males displaying two markedly different social tactics (territorial and non-territorial) with genetic determination of parentage to address three questions: do territorial males sire more offspring than non-territorial males, do females mate with multiple males, both territorial and non-territorial, and do multiple males inseminate individual clutches? Our findings revealed surprisingly high reproductive success in non-territorial males; average numbers of offspring sired by the two male social morphs was similar for all clutches pooled, and separately for first versus later clutches. Most (83%) females sired offspring with multiple territorial and non-territorial males. Moreover, multiple males using both social tactics fertilized most (73%) individual clutches. The homogeneous nature of the semi-natural habitat appears to promote the ability of first-year males to sneak copulations and thereby acquire higher-than-expected levels of reproductive success in this population.

05.03.95 Refined Description of a Gene Locus in Escherichia coli Encoding for Bile Salt Resistance and Sensitivity

Eden Bernstein, Anna Graves, Jim Bidlack, Jonna Whetsel,

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This project is a continued investigation of a chromosomal mutation that causes bile salt sensitivity in Escherichia coli. Previous attempts to narrow down the location of the mutation suggest that it affects the yciS and yciM genes. Our new focus is to conclusively demonstrate that the mutation confers bile salt sensitivity using several strains of E. coli, including the wild type and mutant strains of the bacterium as well as two genetically-engineered strains that lack the yciS and yciM genes. Primers for the yciS and yciM genes have been used to amplify DNA segments from the wild type and mutant strains of E. coli and we are now in the process of cloning and sequencing target DNA. Once cloned, genes for bile salt resistance and sensitivity will be inserted into counterpart bacterial strains to determine if resistant strains can be made sensitive to bile salts and if sensitive strains can be made resistant to bile salts. Results will provide details for a new gene locus description that includes the location, sequence, and phenotype for bile salt resistance and sensitivity in E. coli.

05.03.96 Influence of the Onset of First Egg Production on the Number of Multiple Clutches in Female Collared Lizards

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The number of eggs produced is a strong correlate of fitness in oviparous female squamates (lizards and snakes). Within individual clutches, the number of eggs generally increases with body size, but some female squamates may also increase reproductive output by producing multiple clutches each season. Female collared lizards (*Crotaphytus collaris*) emerge from hibernacula when ambient temperatures and day length increase to acceptable levels, which in central Oklahoma can be as early as mid-March, and as late as the end of April. They produce multiple clutches seasonally, and number of clutches produced is positively correlated with body condition at the beginning of the season, and stored energy. Until 2012, the maximum number of clutches produced during 22 years of previous study was three. In 2012, females began emerging from hibernacula early (March 25), and the 2012 spring/summer was the warmest ever recorded in Oklahoma. For the first time, we observed the production of four clutches of eggs by 20% of females, and most females that survived the entire season produced three. These results suggest that the number of clutches produced is influenced by environmental conditions that influence the onset of first egg production. We are testing this hypothesis further by examining the number and schedule of egg production in individual collared lizard females at Arcadia Lake, over the last 23 seasons during which climatic variables have varied markedly.

05.03.97 Comparative Study of Infectious Diseases in Saudi Arabia and the United States

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Infectious diseases are caused by viruses, bacteria, and parasites. This poster focuses on comparing some of the infectious diseases common to both Saudi Arabia and the United States such as Cholera, Salmonellosis, Malaria, and Shigellosis. We choose diseases with different modes of transmission for our study; water (Cholera), food (Salmonellosis), and blood (Malaria). Lifestyle, environment, and immigration play an important role in the spread these infectious diseases. Our research indicates that there are similarities and differences that helped spread infectious diseases in the two countries studied. The large numbers of immigrants play an important role in the spread of diseases such as Cholera in Saudi Arabia. On the other hand, the environment factors influence the incidence rates for Malaria in both Saudi Arabia and the United States. Food borne infections could be point source or common source epidemics and can be influenced by a wide array of factors. We collected data from official sources, such as, the Centers for Disease Control, the World Health Organization, and Ministry of Health of Saudi Arabia.

05.03.98 Analysis of the Spread and Prevalence of Antibiotic-Resistant Fecal Bacteria Among Wild Animal Populations of Bison and Longhorn Cattle in the Wichita Mountains Wildlife Refuge

Dennis Frisby, Joseph Kheir, Michael Kaiser, Tahzeeba Frisby,

Cameron University

The use of antibiotics and other antimicrobials has become commonplace in modern society. Not only are they used to treat infections and disease in human clinics and veterinary medicine, but also they are routinely used as feed additives in animal and fish farms. Consequently, antibiotic-resistant bacteria are routinely isolated from farm animals. There is growing concern and mounting evidence for the spread of these resistant strains into the environment. While a number of studies have focused on the spread and persistence of antibiotic-resistant bacteria among farm animals and human populations, there is little data available about the levels of resistant bacteria in wild animal populations. Environments, such as livestock farms and human populations, with continuous selective pressure would be expected to have higher levels of antibiotic-resistant bacteria than a nature preserve or wildlife refuge where selective pressure is expected to be low. The focus of this study is to determine the prevalence of antibiotic-resistant fecal bacteria in bison and longhorn wild animal populations on the Wichita Mountains Wildlife Refuge in comparison to agricultural cattle. Suspensions of fecal samples from each animal group were plated on MacConkey agar to select for fecal coliforms which were subsequently tested for resistance to various antibiotics. Initial studies indicate surprisingly higher than expected levels of tetracycline resistance among bison.

05.03.99 Protein Production for Caisson Biotech's HEPTune™

Neda Hessami,

Oklahoma City Community College

Caisson has developed a proprietary heparosan polymer-based drug delivery system, otherwise known as Heptune. In this experiment, Component C was extracted from bacteria. This protein will be used with component A and component B to make HEPTune™, Caisson's drug delivery polymer system designed to improve the performance of many drug compounds in terms of safety, tolerability, efficacy and quality. Cultures were grown in liquid media in a shake flask incubator. With careful timing, materials necessary for growth and production were added to the shake flask cultures. Cultures were grown overnight and harvested by centrifugation at 4°C the following day. The bacteria were resuspended in lysis buffer on ice. The lysates were then clarified by centrifugation. Three different steps were used to purify the protein (Component C). Protein concentration was quantitated by the Bradford Assay using a Bovine Serum Albumin (BSA) standard. The purification was monitored by SDS-PAGE Coomassie Blue staining (protein molecular weight standards, Bio-Rad). Western Blot analyses employed a rabbit antibody followed by detection with protein A-alkaline phosphatase. Yields varied between purification steps accounting for approximately 36% lost.

05.03.100 Development of a Histoplasma Antigen Lateral Flow Assay (Hag LFA)

Candy Palmer,

Other

Histoplasmosis is a fungal infection caused by the dimorphic fungus *Histoplasma capsulatum* var. *capsulatum*. The most virulent form is disseminated histoplasmosis and is most commonly seen in immunocompromised patients. The disease is highly treatable. However, people in resource-poor environments are dying of a treatable disease for lack of an easy, rapid diagnostic tool. The goal of this project was to develop a *Histoplasma* antigen lateral flow assay that could be used in areas with minimal laboratory infrastructure. *Histoplasma*-specific monoclonal antibody 26-10 was grown in Integra bioreactors. The antibody was purified using fast protein liquid chromatography with an affinity resin that binds IgG. The isolated antibody was used to “capture” *Histoplasma* antigen shed by infected patients. Strip appearance was optimized by varying antibody concentration, membrane speeds, and dilution buffers. Strict antibody purification protocols were critical to the elimination of false positives. The research developed a lateral flow product that detected *Histoplasma* antigen at a concentration of 12.5 ng/mL. As such, it provides a highly specific, sensitive diagnostic tool that can be used during the initial point-of-care visit.

05.03.101 Marker Free Genetically Modified (GM) Crops

Bobby Bezinque,

Northeastern State University

The use of selectable marker genes in genetically modified crops has been vital in their research and development. The other methods used to introduce foreign DNA into a plant cell, either by microinjection, particle gun, electroporation, or agrobacterium, are relatively inefficient. Many of the markers used today are antibiotic resistant, such as hygromycin, kanamycin, and ampicillin. These antibiotic resistant genes are used during the genetic modification process; the genes are inserted into genetically modified plants as a marker, which is linked to the new gene with a desirable trait, usually herbicide resistance or insecticide production. The use of these marker genes that are resistant to certain antibiotics is raising concerns among the public. The possible transfer of these antibiotic resistant genes into humans and animals has sparked many new studies into bio-safety and bio-monitoring.