



# Poster Abstracts

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## **Subsurface Well-Log Correlation Of Arsenic-Bearing Lithofacies In The Permian Garber Sandstone And Wellington Formation, Central Oklahoma Aquifer (Coa), Cleveland County, Oklahoma**

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**Presentation Subject Area: Environmental Sciences**

The Garber-Wellington aquifer is an important source of drinking water in central Oklahoma. The formations making up the aquifer, the Garber Sandstone and the underlying Wellington Formation, consist of amalgamated fluvial sandstones interbedded with mudstones, siltstones, and some conglomerates (Breit et al., 1990). Water from some of the wells contains naturally occurring arsenic levels that exceed federal standards (EPA, 2001). Past work suggests that the arsenic is concentrated in water produced from sandstones isolated by finer-grained rocks. This is because the low permeability of the finer-grained intervals inhibits the flushing-out of soluble trace substances by freshwater (Schlottmann et al., 1998). Therefore, one strategy for remediation is to selectively produce water from low-arsenic zones and to limit or avoid completion and development of sandstones isolated by finer-grained lithofacies. This strategy requires the development of an improved stratigraphic model that defines the lateral and vertical distribution of arsenic-prone lithofacies. To accomplish this, geophysical logs from oil and water wells, subsurface core, and outcrops are being used to produce stratigraphic cross-sections and maps (such as net-to-gross and sandstone-shale ratio maps). To date, our work suggests that sand-prone and mud-prone packages within these formations can be correlated but that correlation of individual sandstone bodies is problematic. Through integration of on-going companion studies, the projection of outcrop gamma-ray profiles and paleodepositional environment to the subsurface should help to further constrain the habitat of arsenic and better define regional permeability fairways. (This is an abstract of a proposed presentation and does not necessarily reflect EPA policy.)

## **Characterizing Surface Winds On Mars: Herschel Crater**

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**Presentation Subject Area: Physical Sciences & Technology**

The purpose of this research is to characterize the surface winds for a region of Mars. Wind is the dominate geologic process currently at work on the surface of Mars. An understanding of surface winds is important if we are to understand Mars as a planet. Further, winds and the entrained particles within them can have a detrimental impact on equipment, structures, and future manned missions. The Russian probe Mars 3, for example, is thought to have been rendered inoperative by winds it encountered upon landing. General circulation models (GCM) have been created for the surface winds of Mars. These models are powerful tools for describing and understanding the surface winds of a planet. They have been used to predict regional wind patterns for the Martian surface on a planet wide scale. However, the GCM for Mars have not been thoroughly validated due to a lack of ground truth data.

Though ground truth data for Mars is limited, remotely sensed imagery from flyby and orbiter missions is extensive. The current Martian image catalog consists of data from nearly a dozen successful orbiter and flyby missions with spatial resolutions as high as 1.4 meters. Contained in many of these images are wind

formed (eolian) surface features such as dunes and yardangs. Applying what is known about the relationships of wind, and similar surface features found on earth, we can infer the characteristics of the winds that formed these surface features on Mars. Interpretation of winds through this type geomorphic analogy may be useful for validating GCM in the absence of ground truth data.

In this study, geomorphic analogy of eolian surface features is used in combination with remotely sensed imagery to create a wind map of the Herschel Crater region of Mars. Herschel Crater is a 300 km diameter impact crater in the southern highlands of Mars. It is centered at approximately 228 W longitude and 15 S latitude. The wind map is then compared to previously published GCM results for correlation.

## **Carbon Source Selection In Aspergillus Nidulans**

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**Presentation Subject Area: Biological Sciences**

In yeast the SNF1 gene coordinates glucose availability with other cellular processes such as utilization of alternate carbon sources (e.g., sucrose fermentation) and the cell cycle. Multiple SNF1 orthologous DNA sequence reads were found during the chromosome IV sequencing effort of *Aspergillus nidulans*. The *snfA1* gene was fully sequenced and consists of 793 amino acid residues interrupted by three introns. *snfA1* homologs have been identified in *A. fumigatus*, *N. crassa*, *Magnaporthe grisea* and *Cochliobolus carbonum*. The *snfA1* locus produces a transcript 2.6 kb in size and appears not to be regulated by the carbon source, sucrose, glucose or pectin. The aim of this research is to determine whether or not *snfA1* is required for the utilization of polysaccharides such as pectin considering that yeast cells are unable to utilize them. A *snfA1* deletion strain has been constructed by genetic transformation and its phenotypic characteristics studied. Further, the function of *snfA1* is being analyzed using microarray approach.

## **Oae: Offset Alignment Evaluation**

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Sequence alignment is an important step in the evaluation of the similarity of sequences to one another. Sequence alignment is a prerequisite for estimating the similarity of two sequences. Also, correct alignment of protein sequences is critical for accurate understanding of the evolution of the protein. Therefore, it is important to know how likely an alignment is correct. In order to address the likelihood issue, we need ways to assess the significance of the alignment, so that one can study the most likely way two sequences are related to one another.

Periodicities in the occurrence of similar or identical amino acids are known in many proteins. Structural proteins, such as collagen and alpha helical coiled coils, have regularly repeating sequence motifs. The confidence of correctly aligning a sequence with a decided repeating pattern of amino acid residues may be overestimated. These periodicities in the sequence information are destroyed by randomization used in current methods of assessing significance. Therefore, the offset alignment evaluation method was proposed.

The offset method preserves inherent periodicities in amino acid sequences and it results in significance scores that are better correlated with the alignments and thus better reflect relatedness of sequences. Offset Alignment Evaluation (OAE) is a Java implementation to produce optimal alignment and analysis the significance of the alignment. OAE uses dynamic programming method along with a modification of PAM scoring matrix. OAE takes two sequences and produces an optimal alignment of them according to the user defined gap penalty and gap extension penalty.

## **Evaluating USDA's Conservation Reserve Program (Crp) In Texas County, Oklahoma**

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USDA's Conservation Reserve Program (CRP) is a voluntary program initiated in 1985 in which landowners are encouraged to retire highly erodible lands for 10-15 years. However, CRP has been criticized for administrative shortcomings and failure to achieve ancillary environmental objectives, such as improving wildlife habitat and promoting water quality. The main goal of this research is to evaluate the long-term environmental benefits of CRP. The specific objectives are: 'To accurately map the spatial and temporal changes associated with CRP tracts for Pre-CRP (1985) and Post-CRP (1990) time periods' Using a GIS-based modeling approach, evaluate the long-term environmental benefits associate with CRP.

The study area of the project is Texas County, Oklahoma. This county ranks first in the state in terms of CRP enrollments. The GIS-integrated hydrologic model AV-SWAT (ArcView ' Soil and Water Assessment Tool) is used to evaluate the potential environmental benefits of the CRP in terms of soil and water quality. AV-SWAT is a public domain hydrologic model developed by the USDA-ARS, Temple, Texas. SWAT simulates the effect of management decisions on water, sediment, nutrient and pesticide yields with reasonable accuracy on large, ungaged river basins. GIS is ideally suited for input data management and output visualization purposes. AVSWAT provides a user-friendly interface to easily preprocesses the input data and post process the output data of SWAT. Some of the input data for Texas County include DEM (30m), Soils (STATSGO), LULC (CRP and other cover types). Other data such as management practices (acquired from County Extension Department) and weather (Cooperative Observer Program, COOP). The Beaver River Watershed was subdivided into 53 sub-basins using the DEM as the base data source. The CRP tracts in Oklahoma are evaluated in terms of soil loss, sediment and nutrient loadings. Model calibration was conducted using stream flow data from two USGS gage stations (Coldwater Creek and Beaver River). Performance of model was evaluated using statistical criteria that included relative error (RE), coefficient of determination (R<sup>2</sup>), and Nash-Sutcliffe efficiency (COE). Predicted values generally matched well the observed values (RE 14%, 16%, R<sup>2</sup> 0.62, 0.58 and COE 0.69, 0.53 respectively) when compared on yearly basis. Although the sediment yield was low overall, it correlates well with the CRP area. . Generally, the higher the CRP area the lower the sediment yield. Most of the sediment yield is derived from the southeastern part of the county. Sediment yield is highest from wheat, general agriculture and corn fields with an average of 9.25 2.40, and 0.25 tons/ha/year respectively. Cell-based mapping of sediment yield, derived from the hydrologic response units, shows higher values of sediment yield because it is calculated on a cell (30 m) level. This map can assist in future CRP enrollment.

## **Concept Evaluation For A Potential Market-Nutritional Candy Bars**

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Nutritional-bars are evolving over candy-bars as a result of increasing consumer's health consciousness. However, research indicates poor taste perceptions to have turned consumers from nutritional-bar markets. Study compares candy over nutritional-bars through focus group & one-on-one interviews and evaluates the market potential for novel healthy-candy concept 'Fruitrient'. Respondents (N=97) rated importance attributes as nutrition, taste, flavor, and convenience for 'Fruitrients'. Perceptual maps indicated 'Fruitrient' to be highly nutritional but less convenient than competitor's and flavor was positioned close to ideal indicating that nutrition should not compromise flavor. Data analysis identified target market as 24 and above, middle and upper income females with sales potential above \$300 million.

## **The Impact Of The Near Environment On People's Psychological And Physical Well-Being**

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Housing is a prime concern for people dually diagnosed with mental retardation and mental illness. The "life style" of this population can be improved by providing an environment that is not only physically secure and comfortable but also psychologically stimulating. Gunzburg (1973) rightly said that "the criteria for an environment which can be used as a tool for improving the level of functioning and for socializing the subnormal must be that it allows and stimulates active partaking in normal life experiences" Research needs to be conducted on the factors that influence the physical and psychological well being of these individuals in the group home setting. A review of scholarly articles show significant supporting data that group homes should provide residents control over their environment, mastery of basic life skills, improvement of motor skills, and most importantly a feeling that they are living in a home and not in an institution (Bailey, 2002; Ulrich, 1991).

## **Phase 1: State Park Master Plan, Recreation Facility Inventory**

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Presentation Subject Area: Environmental Sciences**

Oklahoma State Parks, through the Oklahoma Tourism and Recreation Department, has contracted with the Leisure Studies faculty at Oklahoma State University to develop a master plan for the state park system. As part of this contract our research team has developed four phases of development. My research is the first

phase of the contract agreement, encompassing the mapping of all private and public recreation facilities in Oklahoma. My research uses technology from Geographic Information Sciences (GIS), specifically the ESRI software package ArcView, to map these facilities in a spatially oriented environment. GIS systems allow users to understand geographic information in three main ways. First, we are able to map the facilities in a spatially oriented environment that models the real world. Researchers using a GIS system can use real world coordinate systems to draw shapefiles containing information about a specific location on the Earth's surface. Second, the GIS system allows a user to study interactions between different types of facilities. Interactions can be seen by layering surfaces on top of the each other, providing new information in an output layer that may provide insights otherwise unnoticed from the individual layers. Finally, a GIS system provides an ad hoc query environment to study facility use. Query environments, like those provided by ArcView, allow a user to specify questions that fit their current needs from an otherwise unwieldy dataset. My research goal is to provide the datasets for all private and public recreation facilities in Oklahoma including specific amenities, benchmark rating and ownership.

## **Motivational Factors Affecting Participation In Online Financial Planning Educational Opportunities**

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**Presentation Subject Area: Social Sciences**

This study investigated motivational factors that affect interest in participating in online educational opportunities. The sample consisted of 267 financial planners who were members of the financial planning association in the United States. Multiple regression analyses were performed on the five motivational factors. It was determined that, overall, acquiring a degree, acquiring professional advancement and personal enrichment were significant predictors of participation in online educational opportunities. These results provide information to employers who advocate continuing education among their employees.

## **The Current Status Of Instrumental Music Education In Taiwan**

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**Presentation Subject Area: Education**

This study is to understand the current status of instrumental music education from elementary level to secondary level in Taiwan. In addition, the current problems of the instrumental music education in Taiwan will be discussed in this study. The findings of this research will provide recommendations to promote the effective instrumental education system of Taiwan. Four questions will be researched in this study: (1) How many schools are offering the instrumental music programs in Taiwan? (2) What is the qualification of the instructors in teaching the instrumental music programs? (3) What is the level of repertoire usually played in the instrumental music programs? (4) What are the primary problems in training instrumental music groups? A descriptive mailing survey will be conducted in this study. The band directors and music teachers from elementary level to secondary level will be asked to voluntarily participate in this study. A total of 720 instrumental program directors will be randomly selected, 350 from elementary schools, 250 from junior high schools, 120 from senior high schools. The self-administered questionnaire will be developed and

comprised of three sections, which are demographic information, music curriculum and methods, and the current instrumental curriculum and facilities at all levels. The question types will include open-ended and multiple-choice questions. Not only are the questions of current music program's status going to be included, the teachers' and band directors' expectations for the future of instrumental education are also going to be included in this questionnaire. A pilot study will be administered to a representative group of 3 musical professors, 3 practical instrumental program directors, and 1 statistics professor. Their comments will be used to revise and clarify the statements in the survey. The follow-up postal cards will be sent to the participants if the response rate does not reach the expected 30% of total survey population. For the purpose of analysis, the collected data will be grouped into three categories, which are elementary group, junior group, and senior group. In order to understand the current status in these three instrumental education systems, a summarized data will be cross-tabulated by three categories. The current music instrumental programs, the standard of the repertoire, and the qualification of the program instructors will be determined and analyzed from the collected data.

## **Performance Modeling Of Customer Contact Centers**

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**Presentation Subject Area: Physical Sciences & Technology**

Customer call centers, which represent a multi-billion dollar industry, are evolving into customer contact centers in which customer contact happens through other media, e-mail, fax, and the Web. Contact centers differ from the traditional call centers in one important way they allow the possibility of postponing some work (e.g, responding to e-mail). The development of performance models, analytical and simulation-based, is a key research effort being pursued by a multidisciplinary research group at OSU working in the area of information overload.

We present simulation and queueing network models of contact centers, where the customer contact is mainly via e-mail. The simulation models were developed using Arena, which is a leading commercial discrete-event simulation software package. We highlight some of the modeling and statistical issues in the Arena contact center simulation model. The analytical models are based on ongoing research in the development of queueing network models in which the e-mails are processed by a network of customer service agents. We present a queueing network model, which is based on two-moment approximations. This model is solved using a software package called RAQS developed at OSU in the mid 1990s.

We compare the results of the analytical and simulation models for a few example scenarios, and discuss the role played by these two classes of models in the analysis, design, and improvement of customer contact center operations.

## **The Effect Of Low Concentrations Of 3-Nitropropionic Acid On Catecholamine In Sk-N-Sh Cells**

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3-Nitropropionic acid (3-NPA) is a mycotoxin toxin produced by *Arthrinium* spp and has been implicated in the deaths of nearly a dozen people who consumed mildewed sugarcane in China. 3-NPA is useful for the study of a variety of neurodegenerative disorders, including Huntington's Disease, epilepsy, Parkinson's Disease, as well as others. Neurochemically, 3-NPA is classified as a complex II inhibitor of the mitochondrial respiratory chain, resulting in the generation of free radicals. SK-N-SH cells are neuroblastoma cells that are commonly used as a model of neurotoxicity and/or neurodegenerative diseases. The cells were cultured in RPMI 1640, supplemented by 10% fetal bovine serum, and 1% penicillin streptomycin and maintained at 37°C in 5% CO<sub>2</sub> humidified air. After 2 to 7 days, 3-NPA, using different concentrations or times, was added to the 24 well plate. For very small concentrations, 1nM, 10nM and 100nM 3-NPA was used. For medium concentrations, .1μM, .2μM, 1μM, 2 μM, 10μM, 20μM, and 100μM 3-NPA used used. The highest concentrations used were .1mM, 1mM, 10mM, and 100mM. Each concentration ran for 1 and 3 hours. The medium and high concentrations ran for 6 hours. The highest concentrations ran for 24 and 48 hours, while 10mM ran for 12 and 36 hours also. Nonspecific uptake was determined in the presence of either 50nM GBR12909 or 1μM Mazindol. To each well, 400iL of [3H] DA (20nM final concentration) was added to initiate uptake. The plate was placed on a shaker for 20 min at room temperature. Uptake was terminated by removal of buffer and addition of 0.9% ice cold NaCl. [3H] Dopamine uptake was measured following trypsinization of cells and addition of 5mL of scintillation cocktail, and then uptake was determined by scintillation spectrophotometry. The average of the each duplicate is divided by the average of the control and is called %Control. At the lowest concentrations, nM, there was an increase in DA uptake to 140% of control at 1 hour, but was 100% at 3 hours. For the medium concentrations, μM, the average %Control was 100% at 1 hour and 3 hour. At .1 and 1 mM for all time points, there was very little change and the average %Control is 100%. At 10 mM, there is a change in %Control. Since at low times, the %Control is close to 12%, but increases to 55% at 12 Hours. It decreases to 16% by 48 Hours. This shows that 3-NPA increases the amount of DA uptake before the %Control decreases. There was no significant change in the %Control until 10mM at all time points. Studies are currently underway to determine if low levels of 3-NPA may induce neuronal apoptotic or necrotic death, which may contribute to the changes observed in [3H] DA uptake following 3-NPA exposure. Supported by NIH DA13137 to D.R.W.

## **Low-Dose Estrogen In Combination With Soy Can Be Effective In Rebuilding Bone**

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Although sub-optimal dose of estrogen can relieve menopausal symptoms, it cannot prevent bone loss associated with ovarian hormone deficiency. The purpose of the present study was to evaluate whether soy in combination with sub-optimal level of 17βestradiol (E<sub>2</sub>) can reverse bone loss in ovariectomized osteopenic rats. Another objective of this study was to evaluate if the addition of fructooligosacchride (FOS), a non-digestible carbohydrate that supports the growth of beneficial bacteria in the gut, can improve the bone protective efficacy of soy. Seventy two 9-mo old female Sprague-Dawley rats were either sham-operated (sham) or ovariectomized (ovx) and then fed a casein-based semi-purified diet for 90 days to establish bone loss. Thereafter, rats were divided into six groups (n=12): sham, ovx (control), ovx + E<sub>2</sub> (E<sub>2</sub>; 10 μg E<sub>2</sub>/kg body wt. twice per wk), ovx + ½E<sub>2</sub> (5μg E<sub>2</sub>/kg body wt. twice per wk), ovx + ½E<sub>2</sub> + soy; ovx + ½ E<sub>2</sub> + soy +

fructooligosacchride (FOS). 125 days after treatment the rats were necropsied and the bone mineral density (BMD) and content (BMC) of tibia, femur, third and fourth lumbar vertebrae (L3-L4) were measured using dual energy x-ray absorptionmetry. The table below shows the effects of various treatments on selected bone parameters:

| Group                            | Tibial BMD                 | Femoral BMD                | L4 BMD                     | L3 BMC                     |
|----------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Sham                             | 0.1993±0.002 <sup>a</sup>  | 0.2317±0.003 <sup>a</sup>  | 0.2342±0.003 <sup>a</sup>  | 0.1279±0.004 <sup>a</sup>  |
| Ovx+Control                      | 0.1825±0.002 <sup>c</sup>  | 0.2054±0.004 <sup>c</sup>  | 0.2055±0.003 <sup>c</sup>  | 0.1071±0.004 <sup>b</sup>  |
| Ovx+ E <sub>2</sub>              | 0.1892±0.002 <sup>bc</sup> | 0.2097±0.003 <sup>bc</sup> | 0.2132±0.003 <sup>bc</sup> | 0.1163±0.004 <sup>ab</sup> |
| Ovx+½E <sub>2</sub>              | 0.1862±0.002 <sup>bc</sup> | 0.2086±0.003 <sup>bc</sup> | 0.2122±0.003 <sup>bc</sup> | 0.1065±0.004 <sup>b</sup>  |
| Ovx+½E <sub>2</sub> +Soy         | 0.1907±0.002 <sup>b</sup>  | 0.2111±0.003 <sup>bc</sup> | 0.2155±0.003 <sup>b</sup>  | 0.1180±0.004 <sup>ab</sup> |
| Ovx+½E <sub>2</sub> +Soy+<br>FOS | 0.1886±0.002 <sup>bc</sup> | 0.2170±0.004 <sup>b</sup>  | 0.2172±0.003 <sup>b</sup>  | 0.1207±0.004 <sup>a</sup>  |

*Data are mean ± SE (n=12). Values in a column that do not share the same superscript letters are significantly (P<0.05) different from each other.*

The results suggest that the combination of sub-optimal E<sub>2</sub> and soy protein has a greater effect on bone than optimal E<sub>2</sub> by itself. Furthermore, the addition of FOS to soy may enhance its effectiveness in reversal of bone loss as evident by improved femoral and L4 BMD and L3 BMC. FOS may have improved calcium absorption, isoflavone bioavailability or both.

## **An Interactive Internet Map Service Using Arcgis System To Enrich Maximum/Actual Wheat Production Database Of Oklahoma**

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**Presentation Subject Area: Environmental Sciences**

Though great concerns expressed on issues of land quality, sustainable development, potential environmental change, and carrying capacity based on increase of food production from global population increase, current researches indicate that increase of food production could be achieved by appropriate agricultural management without sacrifice of land quality and surrounding environment. Yield gap is the difference of actual yield and Theoretical Maximum Yield. It is used to measure the current level of management practice and potential production promising of the land. Location specific yield gap provides valuable information for sustainable development research, environment policy making, agricultural management, and food production financial aid and investment decision. Hence, an interactive Internet wheat production yield gap surface map for the State of Oklahoma is my research focus. Today's GIS system could bring basic desktop GIS applications to the Internet. Users could access, query, and extract location specific information. Meanwhile, new GIS and Internet technologies make it possible to let reliable remote users (farmers and researchers) update database behind Internet Map Service, or more importantly create and add new location specific information through Internet. The first challenge in the application is to bring all natural, social features corresponding to different geographic unit (in my case actual yield and Theoretical Maximum Production calculated based on information among different units) to a universal unit. A previous research conducted by Dr. Finchum and Dr. Myers in OSU Department of Geography solved the problem by creating a points lattice based on point-in-polygon spatial overlay and appending different layers data to lattice points. The yield gap surface is created using ESRI's ArcGIS Spatial Analysis Tool based on information appended on lattice points and then created as a Map Service to the Internet. The second

challenge is to catch and parse the specific X, Y coordinates of added new points from an ArcIMS Image RESPONSE in ArcXML format, establish a temporary file with X, Y coordinates and their corresponding non-spatial information, display new added points on the fly, and supply query functions based on temporary file. The temporary files are converted to Shapefile after a regular period to create and refresh to a permanent new map service. The purpose of my research is to establish an Internet Map Service using ASP or JSP application with ArcGIS system to display a dynamic, location specific wheat yield gap surface for the State of Oklahoma. Service users could access, query, update, and extract location specific natural, social information related to wheat production, more importantly, they could create new points with their knowledge to enrich maximum/actual wheat production database behind Internet Map Service.

## **Oxidative Stability Of Wheat Germ Oil: Thermogravimetric Analysis**

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**Presentation Subject Area: Biological Sciences**

Wheat germ processing presents challenges due to its high content of polyunsaturated fatty acids and bioactive compounds. These compounds are prone to oxidation and degradation under the conditions used for conventional edible oil extraction and refining methods. Thermal analysis techniques, such as Differential Scanning Calorimetry (DSC) and Thermogravimetric Analysis (TGA) have been used to characterize physical and chemical properties of edible oils.

In this study four wheat germ oil samples were analyzed using a computer controlled TGA (Mettler Toledo TGA/SDTA851e) instrument. Two refined and one crude wheat germ oil samples were obtained directly from a commercial processor. These samples were extracted with hexane from commercial wheat germ. Thermal characteristics of a supercritical carbon dioxide extracted wheat germ oil sample was compared to that of the hexane extracted oil. Efficacy of oregano oil as an antioxidant in the wheat germ oil was also examined (100-1000 ppm oregano oil in wheat germ oil). Both isothermal and non-isothermal TGA tests were carried out at the temperature range of 25-800°C under air and nitrogen. Non-isothermal tests were carried out at 2, 5, 10 and 20°C/min heating rates. The sample size was 4-5 mg. Thermal stability of the oil samples were evaluated based on the TGA, DTG (Derivative gravimetry) and SDTA (Single Differential Thermal Analysis) curves. Thermal decomposition kinetic parameters (reaction order and activation energy) of each oil sample were calculated from Arrhenius equation. The experimental results indicate that TGA is a simple and fast method to evaluate thermal stability and degradation properties of edible oils.

## **Effect Of Mannitol Accumulation On Physiology And Oxidative Stress Protection In Transgenic Wheat.**

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**Presentation Subject Area: Biological Sciences**

Water deficit stress is a major factor that affects crop productivity. Mannitol accumulation has been reported to increase tolerance in plants to water deficit stress through several mechanisms. In this study we evaluate the effect of mannitol accumulation in transgenic wheat that has a bacterial mtld (mannitol-1-phosphate

dehydrogenase) gene causing mannitol biosynthesis in either cytosol or chloroplasts. The objectives are, to study to what extent mannitol protects expanded leaf tissue from oxidative stress and from injury to the photosynthetic carbon fixation. Another objective is to determine the osmotic effects in the growing regions of the plant. Preliminary data show an increase in photosynthetic CO<sub>2</sub> fixation in transgenic plants over the wild type under stress. The accumulation of mannitol did not lead to osmotic adjustment in mature leaves, but we are looking into possible osmotic adjustment in young growing leaf parts. Mannitol accumulation even to a small extent can have positive effect by protecting the plants from oxidative stress because mannitol is a known scavenger of hydroxyl radicals. Presently we are doing a comprehensive study on the effect of mannitol in protecting transgenic wheat from damage due to reactive oxygen species.

## **Watershed Restoration Feasibility For The Washita Battlefield National Historic Site**

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**Presentation Subject Area: Environmental Sciences**

The National Park Service is exploring the feasibility of restoring a section of the Washita River within the Washita Battlefield National Historic Site (WABA) to the condition at the time of a historic battle in 1868. The purpose of the project is to describe and explain the changes to the Washita River and to determine if restoration is possible. An overlay was produced by analyzing four sets of aerial photos from 1961, 66, 74, and 82. Observations of the overlay indicate that small sections of the river are drying up, the channel is becoming narrower, and vegetation encroachment is taking place along sandbars. A map of the watershed, including the battlefield, was compiled to locate flood control dams that the Natural Resources Conservation Service constructed during the 1960's in order to reduce peak flows in the river and thereby prevent flooding. Records of streamflow measurements and peak flows from a gauging station located at the downstream end of the study watershed in Cheyenne, Oklahoma support observations that the river has become more stable. One negative effect of this new stability is the entrenchment of the river. It can be inferred from the data that the river has adjusted to the reduced peak flows caused by the flood control dams. If the channel is in equilibrium with the prevailing period of peak flows and sediment load then restoration may prove impractical and uneconomical. A more detailed study of the river can reveal more concerning this entrenchment and economic feasibility of restoring the river.

## **The Phase Equilibria Of High-Pressure Gas Adsorption On Carbon Adsorbents In Water**

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Deep coalbeds retain large quantities of gases such as methane, nitrogen, and CO<sub>2</sub> through adsorption. When a gas adheres to the surface of coal, the solid-gas interactions present can change the apparent gas density to that comparable to liquids. Understanding of the adsorption phenomenon in coalbeds presents additional challenges, because the coal present in wells contains water. Typically, adsorption experiments

are done on water-saturated coal rather than dry coal to simulate the in-situ conditions of gas adsorption in wells. Water can lower significantly the adsorptive capacity of coal for methane and carbon dioxide isotherms. Dry-coal isotherms are not indicative of the actual gas adsorbed in wells. Models are sought that predict qualitatively the effect water has on gas adsorption from dry to water-saturated coal.

A hard-sphere EOS was developed that can accurately represent the PVT behavior of many normal fluids and water up to 50 reduced pressures and can represent saturated VLE properties to less than 1% in general. The EOS constants for different fluids were determined by utilizing Quantitative Structure Property Relationships (QSPR). The hard-sphere EOS was incorporated into the simplified local density model to predict the effects of water on gas adsorption. We accounted for the effect of water on matrix adsorption by assuming that water is an adsorbed component in a three-phase (liquid-vapor-adsorption phase) equilibrium system. Predictions of gas adsorption in water are shown against measured systems on wet activated carbon and wet coals.

## **"Structural Analysis In Buyuk Menderes Shear Zone, Bascayir Region, Western Turkey"**

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**Presentation Subject Area: Environmental Sciences**

The central Menderes Massif Metamorphic core complex is bounded by two east-trending grabens, the Alasehir (Gediz) graben to the north and the Buyuk Menderes Graben to the south. Field-oriented geological studies in the central Menderes Massif metamorphic core complex suggest the presence of two low-angle detachment surfaces: 1) a north dipping detachment along the southern margin of the Alasehir (Gediz) Graben, termed the Alasehir Detachment and 2) a south-dipping detachment surface along the northern margin of the Buyuk Menderes Graben, named the Buyuk Menderes Detachment. Although the Alasehir Detachment has been studied in detail in recent years, the Bascayir Detachment remained relatively unstudied.

In this study, we mapped the footwall and hanging wall rocks of the Bascayir Detachment in the vicinity of the village of Bascayir on a 1/10 000 scale topographic map. We also examined characteristics of cataclastic and mylonitic features in the footwall of the detachment surface. The footwall is made up of quartzite and marble intercalated micaschists. The hangingwall contains the gneissic metamorphic rocks and the Early-Miocene sedimentary rocks, usually referred in the area as the Haskoy Formation. A disconformity is also observed in the hanging wall between the gneissic metamorphic rocks and the sedimentary rocks. The footwall rocks contain well developed shear-sense indicators. Our preliminary examination of these shear sense indicators along the footwall of the Buyuk Menderes Detachment suggest that the detachment contains both top to the North and top to the South shear sense indicators. This, in turn suggests that the Buyuk Menderes Detachment may have developed in two stages.

## **Post Remediation Characterization Of LNAPL Using Direct Push Electrical Resistivity Tomography**

**Ivy Graham and Todd Halihan, Stan Paxton, Mat Riley**

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Presentation Subject Area: Environmental Sciences**

Site characterization of LNAPL plumes continues even after a contaminated site has undergone remediation, since a site must be determined to pose no significant risk to be closed in most states. The standard method is to monitor wells over a period of time and interpret whether a site has been effectively remediated. If the level of LNAPL is still above acceptable levels, the site characterization is often determined to be incomplete due to either a poorly understood geological framework or an unknown source. A study was performed to test the effectiveness of a direct push electrical resistivity tomography (DPERT), in evaluating post remediation LNAPL traces. The site used for the study had previously undergone separate pump-and-treat and surfactant flush remediation. The study utilized direct push techniques to install vertical electrodes at approximately 24 feet in depth. The vertical electrodes were sampled in conjunction with surface electrodes to generate an electrical tomogram of the subsurface electrical properties. The tomograms were correlated with core samples, direct push electrical conductivity logs and chemical analyses. The technique illustrated several locations of remaining LNAPL at the site that existed away from monitoring well locations.

## **The Effects Of Stress On Male Rat Liver Sulfotransferases**

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Presentation Subject Area: Biomedical Sciences**

To examine the role stress plays on sulfotransferase expression, rats were subjected to exercise (EX) and parathion (PS) treatments and the enzyme activity of their livers studied. Four groups of rats were designated control, exercise, parathion, and exercise+parathion, and treated for one week. Rats in the groups including parathion were treated with either 1.8 or 3.6 mg/kg/day of the drug while those in the exercise groups received one hour of exercise per day for the seven days of treatment. Using the liver cytosols obtained from these groups, hydroxysteroid sulfotransferase (STa) and aryl sulfotransferase (AST-IV) expressions were investigated using enzyme assay and Western blot techniques. Our enzyme assay results demonstrated that exercise and parathion increased both AST-IV (90-130%) and STa (50-70%) activities. However, the results from the combined stressors (EX+PS) did not deviate significantly from each stressor alone. While the Western blot analysis concurred with the assay results for STa, the enzyme activity results and Western blot analysis of AST-IV did not correlate. In order to confirm our results, we measured reduced glutathione(GSH) in the liver cytosol and found a significant increase in the exercise and parathion groups and a slightly higher increase in the combined groups. These results agree with the increase in activity indicated by the enzyme assay results. Our findings suggest that environmental stressors alone, in the form of both mechanical and chemical stressors, significantly influence sulfotransferase activity and expression, whereas their combined effect is negligible.

## **Outcrop-Based High Resolution Gamma-Ray Characterization Of Arsenic-Bearing Lithofacies In The Permian Garber Sandstone And Wellington Formation, Central Oklahoma Aquifer (COA), Cleveland County, Oklahoma.**

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The Central Oklahoma Aquifer (COA) supplies drinking water to a number of municipalities in central Oklahoma. Two major stratigraphic units in the COA, the Garber Sandstone and Wellington Formation, contain naturally occurring arsenic that exceeds government mandated drinking-water standards (EPA, 2001). Previous work in the COA (Schlottman et al., 1998) has shown that arsenic concentrations in the aquifer vary with subsurface water chemistry and proximity to finer-grained lithofacies. In order to better describe the aquifer quality and constrain the distribution of arsenic with lithofacies, we have constructed numerous high-resolution spectral gamma-ray profiles of the Garber-Wellington outcrops using a portable gamma-ray scintillometer. In addition, rock samples associated with each gamma ray reading taken from outcrops were returned to the laboratory for textural analysis and statistical evaluation. We find that many of the arsenic-bearing lithofacies are characterized by high total gamma-ray counts (associated with K, U and Th respectively). This result is because arsenic in the rocks is associated with iron oxide that appears to be enriched in the finer-grained, clay-rich lithofacies. Calculated permeability profiles mimic fining-upward grain-size profiles characteristic of fluvial depositional settings. Data from previous USGS studies (cores, geochemistry, petrography, and x-ray diffraction) are being incorporated into the evaluation of the gamma-ray responses as well. Results of this work are being integrated with other on-going companion studies to constrain subsurface well log correlation and the reconstruction of paleodepositional environments in the Garber-Wellington interval of the COA. (This is an abstract of a proposed presentation and does not necessarily reflect EPA policy.)

## **Characterization Of Surface Acid Properties On Nafion Catalysts**

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**Presentation Subject Area: Physical Sciences & Technology**

Characterization of the surface acid properties of solid catalysts is important when attempting to design catalysts for chemical reactions. In this paper, we discuss methods used to obtain surface information about a Nafion-silica composite catalyst for use in alkylation and dimerization reactions. Scanning electron microscopy (SEM) is used to estimate pore size and Nafion particle size, as well as to compare fresh and deactivated catalysts to determine mechanisms for catalyst deactivation. Infrared Spectroscopy (FTIR) and temperature programmed desorption (TPD) are used to determine acid site strengths, types, and the distribution of acid site strengths on the catalyst. FTIR is used to determine if the acid sites are Bronstead or Lewis type sites. A method called dc-TPD [1] is used to estimate the acid site strength distribution on the catalyst. Isopropanol is used as a probe base. TPD spectra are measured in a helium stream with low base partial pressure in order to ensure fast desorption of base from the catalyst surface. The TPD spectrum obtained is assumed to be the sum of a series of spectra from different acid sites with different acid strengths distributed on the catalyst. A relationship between the TPD spectrum and the activation energy distribution for desorption is then derived assuming that the desorption of base from the acid sites can be approximated by an irreversible first order reaction rate equation with activation energy and frequency factor values that

correspond to the strength of the acid sites [1]. The distribution functions obtained are then used to quantify the relative amounts and strengths of acid sites on the catalyst surface.

## **Etiquette Books As An Example Of American Women's Writing, 1865 - 1915**

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**Presentation Subject Area: Humanities**

After the Civil War, Americans were eager to claim a distinctive democratic style of manners. In the past, Americans had primarily imported etiquette manuals from Europe but Reconstruction Americans were ready to set themselves apart and declare that the United States had an accepted set of manners and traditions that were equal, if not superior to European customs. Consequently, American writers began to produce more books on proper conduct and etiquette. The number of etiquette books written by women was also rising dramatically. I examine this early example of women's professional writing by using theory from feminist criticism. I am seeking to answer questions such as: How much existing rhetoric did female authors adopt from their male and European counterparts? Was there a body of rhetoric that was original to them? What roles did writers fill that might have justified authorship of etiquette advice? Did female authors attempt to improve the position of women? How did female authors characterize themselves in their role as author and social legislators within their texts? Did they portray themselves as progressives or as guardians of traditional behavioral codes? Did these women believe everything they wrote or is there irony in some of their claims?

To answer these questions, I focus on etiquette manuals written by American women between 1865 and 1914 including manuals by male writers for comparison. In addition, I have explored relevant works in history, rhetoric, and criticism providing the background necessary for a thorough exploration of my topic. I have collected etiquette books from libraries throughout Oklahoma and by special order. The result of my research will be a comprehensive critical paper describing my findings.

My study will shed light on the way women approached writing non-fiction works in a genre that already had an accepted rhetoric created by European and American male writers. Currently, many scholars, critics, and students are interested in how women have expressed their lives in writing and how they have characterized themselves within their texts. Several scholars have used etiquette books for historical and sociological studies. Few, however, have looked at these works from a literary standpoint. My examination of etiquette manuals will illuminate an overlooked area providing insight into both writing by women and the roles that women played during this time period.

## **Variables Affecting College Students' Satisfaction Of School Foodservice Quality On Healthy Eating**

**Shih-Ming Hu and Jerrold Leong**  
**School of Hotel and Restaurant Administration**  
**Oklahoma State University**  
**Presentation Subject Area: Humanities**

The purpose of this study is to determine if college student satisfaction with school foodservice quality on healthy eating, and the variables affecting students' satisfaction of healthy eating in school foodservice. Their attitude toward healthy eating and nutritional knowledge will also be determined. A descriptive questionnaire survey will be formulated and data analysis techniques will be selected. The information regarding students' overall satisfaction with school foodservice quality on healthy eating and the variables affecting students' satisfaction of healthy eating in school foodservice will be determined and tested the relationship. A total of 1000 students in Oklahoma State University will be selected in this study. As in the focus group, participants will be screened for having eaten in school cafeteria at least once during the previous two weeks. The survey will be conducted inside of every school cafeteria during lunch or dinner time. SPSS for Windows software (version 11.0.1, 2001, SPSS, Inc, Chicago, IL) will be used for all data analyses. The frequencies on all variables as well as cross-tabulation by age, gender, major, and frequency of visiting school foodservice will be constructed. Stepwise multiple regressions will be used to determine the relationship between dependent variable, satisfaction, and independent variables which affect students' satisfaction of healthy eating in school foodservice. The findings can provide directions to improve student satisfaction on healthy eating in school foodservice and promote healthy eating in the college environment.

## **Factors Affecting Chefs' Best Practices Of Healthy Food Preparation**

**Shih-Ming Hu and Cheng-I Wei**  
**School of Hotel and Restaurant Administration**  
**Oklahoma State University**  
**Presentation Subject Area: Humanities**

The purpose of this study is to find out a good direction to promote chefs' best practices of healthy food preparation. The finding will be useful for determining the need to provide additional training materials for chefs and school curricular for foodservice students to ensure the best practices of healthy food preparation and protect the customers. The research questions in this study are: (1) What is the relationship between chefs' practices of healthy food preparation and their nutritional knowledge, attitudes toward healthy food preparation, training backgrounds, and years in foodservice industry? (2) Are chefs' nutritional knowledge, attitudes toward healthy food preparation, training backgrounds, and years in foodservice industry useful in predicting their best practices of healthy food preparation? (3) Does chefs' training background have a positive relationship with their nutritional knowledge and attitudes toward healthy food preparation? A descriptive questionnaire mailing survey will be conducted. A total of 400 chefs of the independent restaurants in Oklahoma were randomly selected from the yellow page of SuperPages.com to participate in this study. These chefs were selected due to their experience and knowledge in food preparation and designing menu. The information regarding chef's training backgrounds, working years in foodservice industry, current nutritional knowledge based on Dietary Guidelines for Americans, attitudes toward healthy food preparation, and practices of healthy food preparation will be determined and examined the relationship between chefs' practices of healthy food preparation (DV) and the other four variables (IV). SPSS for Windows software (version 11.0, 2001, SPSS, Inc, Chicago, IL) will be used for all data analyses. For data analysis purposes, responses will be divided into three groups of chefs by their three different professional training backgrounds, which are apprenticed chefs, chefs held a foodservice related degree, and certified chefs. Standard multiple regressions will be conducted to answer the research questions in this study. Chefs' practices of healthy food preparation will be simultaneously regressed on the set of 4 predictors, training background, nutritional knowledge, attitude toward healthy food preparation, years in foodservice industry.

## **Laser-Based High Spatial Resolution NDVI Measurement**

**Roshani Jayasekara and Carol Jones**  
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**Oklahoma State University**  
**Presentation Subject Area: Physical Sciences & Technology**

The goal of this study was to develop a laser system to detect reflectance based Normalized Difference Vegetation Index (NDVI) at a small spot in a field crop. Detection of multi-spectral reflectance of field crops offers great opportunity for discriminating small spatial features in the crop. A particular opportunity is detection of weeds in field crops. In contrast to conventional applications of machine vision, this strategy offers the opportunity to minimize the effects of variation of natural lighting (sunlight) through modulation and frequency sensitive detection. The performance of this system was characterized with regard to discrimination of target plants from background. The influences of sensor to target distance, sunlight levels, and target size were characterized.

## **At-Risk Students: A Study Of Teenage Mothers In An Oklahoma Alternative School Pertaining To Education, Multi-Generational Patterns, And Socio-Economic Status**

**Felecia Jenkins and Dr. Gary Steward**  
**McNair Scholars Program**  
**University of Central Oklahoma**  
**Presentation Subject Area: Social Sciences**

This study reveals the struggles of teenage mothers. Data gathered from participant surveys and in depth interviews was analyzed. This research was conducted at an Oklahoma Alternative School for at-risk students. The main focus of the study was to explore how the young women in this study negotiated motherhood, education, socio-economic status, and how teenage pregnancy relates to multi-generational patterns. The second section details information gathered from fifteen students using in-depth interviews.

## **A Pilot Study Of The Efficacy Of Screening Tool Identification Of Young Children "At Risk" For The Fmr-1 Gene Mutation**

**Vanessa Johnson-Thomas and Patricia Self, Ph.D., Stephanie Sherman, Ph.D. & Nancy Carpenter, Ph.D.**  
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**Oklahoma State University**  
**Presentation Subject Area: Biomedical Sciences**

Fragile X Syndrome (FXS), the most common inherited form of mental retardation and learning disabilities, is one the few disorders affecting child behavior for which the exact genetic mutation has been identified. It is imperative to identify children affected with this complex syndrome, as interventions to decrease symptoms exist and research geared toward effective treatment and corrective interventions is occurring increasingly. Legislators have emphasized the importance to “learn, teach, and promote awareness of the

incidence, causes, symptoms, effects, and treatment of Fragile X: and support screening for Fragile X to permit early intervention and treatment” (Watkins, 2000).

Identifying infants and toddlers with FXS is especially challenging since many of the unique behavioral symptoms are not obviously manifested until 18 to 24 months of age. The Biopsychosocial Screening Inventory for Fragile X Syndrome (BIPSSI-FX) is a parent response tool designed to address the special challenges of assessing very young children with a screening instrument that may be appropriately used in both clinical and non-clinical settings. The BIPSSI-FX uniquely includes a “Biological Parent” subscale, thus not only facilitating identification of the child, but also distinguishes the carrier. It is anticipated that the inclusion in the BIPSSI-FX of characteristics identified repeatedly in research studies of intellectually normal carriers, such as premature ovarian failure, depression, anxiety and obsessive-compulsive behaviors, will facilitate identification of carriers as well as accurate detection of FMR-1 gene mutation ( the gene that causes FXS) “at risk status” in young children.

The BIPSSI-FX was pilot tested on children between the ages of 12 months to 18 years of age in a family with a relative diagnosed with FXS. This purposive sample of 30 subjects were hypothesized have a greater frequency of FMR-1 carriers than in the general population. The FMR-1 gene status of all participants was unknown. The parents or legal guardians of the children completed the BIPSSI-FX twice, one month apart, in addition to well-established parent response behavioral tools to facilitate the assessment of concurrent validity and test-retest validity. Relevant environmental factors and the utility of the BIPSSI-FX were analyzed by the data collected from additional parent response tools. Additionally, the parents collected a buccal (cheek) cell swab sample from the child, which is comparable to brushing one's teeth. The extracted DNA was analyzed for FMR-1 gene to determine carrier status. A portion of the sample's DNA is currently being reanalyzed for the FMR-1 gene mutation, to ensure accurate analyses.

Preliminary results from the present sample include the presentation of psychosocial items and a description of both a normative and FMR-1 mutation sample. The assessment of the subtle features frequently associated with carriers in conjunction with the multisystemic features of FXS and the corroborating DNA analysis will aid in the rapid and valid screening of young children at risk for the FMR-1 gene mutation.

## **Using Sonar And Digital Imagery To Estimate Crop Biomass**

**Carol Jones and N. O. Maness, M. L. Stone, R. Jayasekara**  
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**Oklahoma State University**  
**Presentation Subject Area: Physical Sciences & Technology**

Sonar has been used extensively to detect proximity and distance in machine vision and digital imagery can be used to estimate vegetative coverage. The combination of sonar response and digital imaging analysis into a procedure to accurately estimate plant biomass will facilitate the ability of growers to make more accurate harvesting and chemical application decisions. Ultimately, the procedure may be incorporated into machine vision variable rate application technology as well as general plant health study.

## **Nutritional Composition Of Oklahoma Grown Peanuts As Affected By Conventional Breeding**

**Ramakanth Jonnala and N.T.Dunford and K. E.Dashiell**

**Department of Plant and Soil Sciences  
Oklahoma State University  
Presentation Subject Area: Biological Sciences**

The cultivated peanut (*Arachis hypogaea* L.) is an important oil and food crop currently grown on approximately 35,000 acres with a production of 98 million lbs in Oklahoma. Conventional breeding is widely used for modification of various crop and oilseed traits such as fatty acid composition and disease resistance. The peanut breeding program at the Oklahoma State University addresses the high priority demands of the Oklahoma peanut industry. Traits such as high yield, high oleic fatty acid content, resistance to *Sclerotinia* blight and early maturity have been given top priority. The effect of breeding on the nutritionally beneficial bioactive plant components has never been investigated.

The objective of this research project is to examine the changes in the composition of lipid related bioactive peanut components that may occur due to the breeding. The specific objectives are as follows: 1) Determination of nutritional composition of peanut varieties developed for Southwestern U.S., 2) Examination of the composition of their traditional counterparts. 3) Comparison of the compositions and determination of differences that might present safety or nutritional concerns or health benefits.

The peanut lines Tamrun OL01, Tamrun OL02, TX977164, and TX977239 were analyzed for their moisture, ash, protein, oil, total dietary fiber and mineral composition. Sunoleic and Tamrun 96 were the parent lines used for conventional breeding and they were used as controls to examine the compositional changes in the samples. Fatty acid compositions of the samples were determined by gas chromatography. Results indicated that compositional variations in modified lines were minimal except for the fatty acid composition. Oleic acid content of the modified lines was significantly higher than that of the parent lines.

## **Complete Nucleotide Sequence And Characterization Of pBJS, A Plasmid Of The Phytopathogen Spiroplasma Citri BR3-3X**

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Presentation Subject Area: Biological Sciences**

The complete nucleotide sequence of a high copy number plasmid, pBJS, of the plant pathogenic mollicute *Spiroplasma citri* BR3-3X is presented. The sequence is 12,867 base-pairs (bp) in length and encodes seven putative open reading frames (ORFs), two of which have no homologs in other bacteria. One of the ORFs with homologs (*arp1*), characterized previously from *S. citri* BR3-T, a derivative of BR3-3X, encodes the spiroplasma adhesion related protein 1 (SARP1). SARP1 is a putative adhesin hypothesized to be necessary for the *S. citri* transmission by its major U.S. vector, the beet leafhopper *Circulifer tenellus*. All the remaining ORFs (*soj*, *traE* and *mob*), except for a small spiroplasma viral ORF (*sv-orf4*) with an unknown function, are homologous to genes involved in chromosome partitioning, DNA transfer and mobilization, respectively, in other bacterial genera. The presence of *arp1*, *soj*, *traE* and *mob* together on pBJS may contribute to the acquisition and stability of the plasmid in spiroplasmas, in addition to influencing the leafhopper transmissibility and plant pathogenicity of the mollicutes.

## **Micromachining Of Silicon By Short Pulse Laser Ablation In Air And Under Water**

**Ganesh Kanbargi and Choo, K.L., Ogawa, Y., Otra, V., Raff, L.M., and  
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**Presentation Subject Area: Physical Sciences & Technology**

The main objective of this investigation is to compare the performance of short pulse (25 ns) laser ablation of silicon using a KrF ( $\lambda = 248$  nm) excimer laser in air and under water at various laser fluences and number of pulses. Laser ablation drilling tests were conducted on a silicon workpiece both in air and under water. The drilled surfaces were characterized using conventional optical and scanning electron microscopes, as well as a laser interference microscope. Once the laser fluence exceeds a certain threshold value (1.7 J/cm<sup>2</sup>), the ablation depth was found to increase rapidly with respect to the laser fluence with the variation being nonlinear. The ablation depth was also found to depend on the number of pulses, increasing with increasing number of pulses. The differences between laser ablation under water and in air are presented in detail.

## **Outcrop-Based Lithofacies And Depositional Setting Of Arsenic-Bearing Permian Red Beds In The Central Oklahoma Aquifer, Cleveland County, Oklahoma**

**Kathleen Kenney and S.T.Paxton, S.J. Smith, S.C. Christenson and R.W. Puls**

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**Presentation Subject Area: Biological Sciences**

In January 2001, the Environmental Protection Agency established safe drinking water standards for arsenic at a maximum concentration of 10  $\mu\text{g/L}$ . Results from the National Water-Quality Assessment Program (USGS), however, document the occurrence of arsenic concentrations in drinking water well above the allowable standard. Based on the work of Schlottman et al. (1998), concentrations of arsenic tend to occur in thin sandstone layers that are isolated between thick layers of mudstone. In contrast, arsenic concentrations are lower in thicker sandstone-prone intervals that tie into areas of active surface recharge. As a means to evaluate various approaches to arsenic remediation, we are developing a lithofacies and stratigraphic framework for the Permian (Leonardian) Garber Sandstone. Detailed study of outcrops in Cleveland County and surrounding area has yielded nine lithofacies. The very fine- to fine-grained and moderately well-sorted sandstone lithofacies include 1) massive sandstone, 2) ripple laminated sandstone, 3) sandstones with horizontal to low angle planar laminations, and 4) tabular and trough cross bedded sandstone, some with mud rip-up clasts. Other lithofacies include 5) carbonate clast conglomerate, 6) mud clast conglomerate, 7) iron stone, 8) shale/laminated siltstones, and 9) blocky mudstones. These lithofacies and their associations provide the foundation for construction of lithofacies maps, vertical stratigraphic profiles, and paleoenvironmental reconstructions. A fluvial depositional setting for the Garber Sandstone is supported by the presence of lenticular-shaped sandstone bodies, erosional truncation of underlying units to produce channel forms, fining upward vertical grain-size profiles, and rapid lateral changes in the proportion of sandstone and shale. These findings are being used to constrain the habitat of arsenic in the aquifer system and as input to regional fluid flow modeling.

## **Internet Standards: How One State's Small Business Websites Compare To Expectations**

**Chia Ling Khoo and Dr. Glenn Muske, Dr. Hong Yu**  
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**Oklahoma State University**  
**Presentation Subject Area: Social Sciences**

The purpose of this research is to evaluate a sample of the smallest businesses from a rural Great Plains state to see how these sites compared against a set of standards developed from a literature review. The research is mainly focused on how rural sites and sites of food-based businesses compared to urban and other product and service websites.

Today's small business owners are increasingly realizing the importance of establishing an Internet presence to have a complete marketing strategy with enhanced customer service. The Internet can create an opportunity for small business owner to reach a national and international customer base. It also creates new opportunities for niche products and services that small rural enterprises may be uniquely positioned to tap. Today's web consumer is increasingly sophisticated and demands that websites meet certain standards such as being appealing, easy to use, quick to download, offer no-hassle returns and exchanges, and provide sufficient product or service information.

Based on review of the literature, 40 variables were identified as key elements in the development of a website. The variables were divided into four basic categories: overall site evaluation, consumer confidence keys, technical and design considerations, and accessibility. A sample of 72 Oklahoma small businesses that sells various products through the Internet was categorized by location of the company - rural or non-rural and by business type, food/candy/spice or other. The study found that the largest area of concern was the lack of variety of ways a customer could order or get assistance. The information found from the study will be useful in helping business owners remain aware of the changes and develop a competitive website.

## **Examining The Immediate Family Smoking Histories And Beliefs Towards Smoking Of Cigarette Smokers And Non-Smokers**

**Jimmy Leverette and Dr. Barbara Green**  
**McNair Scholars Program**  
**University of Central Oklahoma**  
**Presentation Subject Area: Social Sciences**

The purpose of this study was to examine 1) the immediate family smoking histories and 2) the beliefs towards smoking of cigarette smokers and non-smokers. The objective was to determine if the two groups were different from or similar to each other in regards to those two areas. The researcher administered a survey to 188 participants who were enrolled for summer school courses at the University of Central Oklahoma. The hypothesis formulated was that there would be a statistically significant difference in the immediate family smoking histories and beliefs towards smoking of both groups. With the use of Independent Sample T-tests and Descriptive tests, it was found that there was a significant difference in the immediate family smoking histories of both groups, but no difference in the beliefs towards smoking of both groups. Based on these results, there should indeed be more emphasis placed on the smoking cessation of parents as well as a consistent reinforcing of the health dangers and addiction involved with cigarette smoking.

## **Incarcerated Fathers And Their Attitudes Toward Parenting**

**Tasha Lewis Dr. LaDonna Atkins**  
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**University of Central Oklahoma**  
**Presentation Subject Area: Environmental Sciences**

This study investigates fathers' attitudes toward parenting while they are incarcerated. Most of the research done in the area of incarceration has looked at the children; even more specifically children of incarcerated mothers. The area of incarcerated fathers and their children has not been given much attention. This area of study has received more attention in the recent years but still needs more attention. There are an estimated 1.6 million children who have a parent that is incarcerated. This figure does not include the children that have a parent incarcerated at some point during their life. This study adds to the research already conducted in the area of fathers because it examines the fathers' attitudes towards their fathering role. This study examined the attitudes of six presently incarcerated fathers and one father that was recently released. Information was gained by a one-on-one interview with the researcher and questionnaires filled out by the father. This study seeks to gain understanding about incarcerated fathers' views of their role as a father while incarcerated, resources they have taken advantage of, and resources they would like to have in the future to help fulfill their role.

## **Oklahoma State Parks Recreation Expenditure Survey**

**Yating Liang**  
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**Oklahoma State University**  
**Presentation Subject Area: Social Sciences**

The Oklahoma State Parks Recreation Expenditure Survey is part of Oklahoma State Parks Visitor survey. The purpose of the study is to evaluate the economic impact of the recreation activities in state parks. The research questions are to find the relationship between total recreation expenditure and nights spent away from home and home distance from the park. The results showed that to predict the total expenditure to a state park, night spent away from home and home distance from the state park are useful predictors.

## **Factors Effecting English Academic Achievement Of High School Students In Oklahoma**

**Charla Long**  
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**Oklahoma State University**  
**Presentation Subject Area: Education**

The ability to direct motivation, self-efficacy, and competence toward an achievement and an academic goal continues to be a concern for educators. Therefore, part of the variability in achievement may be attributed to self-efficacy, competence, and autonomous motivation through the utilization of a content-specific area.

This study investigates self-regulated learning, competence, autonomous motivation, and gender that effect students' academic achievement in English. The sample consisted of 49 high school students in Oklahoma who attended a daylong university-sponsored American College Testing (ACT) preparation workshop. Students were administered surveys assessing the variables of interest. The students also completed separate ACT practice tests, including English, during the workshop. The workshop coordinator facilitated the completion of the surveys among the students who had agreed to participate in the study. Linear Regression analysis was performed on the four factors. It was determined that competence was the most affected factor during academic performance, thus indicating that students who perceive themselves as competent in an academic area will have higher academic achievement

## **Isolation And Characterization Of Lactobacillus Species Having Potential For Use As Probiotic Culture For Dogs**

**Sandra McCoy and Stanley E. Gilliland**  
**Department of Animal Science**  
**Oklahoma State University**  
**Presentation Subject Area: Biological Sciences**

The need to control pathogenic microorganisms in the intestinal tract of dogs is a growing concern. Little information has been published on the make up of the intestinal microflora of the dog. A Japanese study reported occurrence of species of Lactobacillus and Bifidobacterium in canine fecal flora (Mitsuoka et al, 1976. Zbl. Bakt. Hyg., I. Abt. Orig. A 235: 485-493). There is interest in using probiotics such as species of Lactobacillus to help control canine intestinal infections. For successful use, the bacterial species should be of canine intestinal origin since these species exhibit host specificity. The objective of this study is to isolate and characterize cultures of species of Lactobacillus for potential use as a probiotic to supplement dog food.

Serial dilutions of freshly voided dog feces were plated on Lactobacillus Selection (LBS) agar to isolate the cultures. Isolates were identified based on Gram stain, Catalase test, fermentation patterns using API 50 CH kits, and DNA analysis using a Qualicon RiboPrinter Microbial Characterization System. All potential isolates were compared for bile resistance based on relative ability to grow in broth containing 0.3% Oxgall, and for the ability to inhibit Salmonella typhimurium in associative broth cultures. Of the lactobacilli isolated, Lactobacillus reuteri was the dominant species. However, Lactobacillus acidophilus also was isolated. We found variations among the isolates of L. reuteri and L. acidophilus with respect to bile tolerance. In general, isolates of L. reuteri appeared to be more bile resistant than did isolates of L. acidophilus. There were also variations in the ability to inhibit growth of S. typhimurium.

Further research is needed to determine stability of the chosen culture during processing and storage of pet food.

A suitable probiotic culture for use as a dog food supplement will be useful in helping control intestinal pathogens, thus, providing healthier, happier pets and providing added value to the pet food industry.

## **Impact Of The Internet In Higher Education**

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**Presentation Subject Area: Physical Sciences & Technology**

The purpose of this study is to examine 1) if college students believe use of the Internet is improving their education and 2) if college students believe use of the Internet is improving their grades. The researcher administered a survey to college students enrolled for summer school courses at the University of Central Oklahoma. The hypotheses formulated were that college students would believe that the use of the Internet improves education and improves grades. The results of this study accepted these hypotheses. For the purposes of this study, all students reported that they used the Internet at a high level. Students' grade point average was not collected. It is important in future research for the grade point average of each participant to be acquired in order to prove that college students who use the Internet have higher grades than those who do not. Also, participants who do not use the Internet very often should be surveyed in order to run comparison tests.

## **PCR Amplification Of Multiple Gene Loci For Detection Of *L. Monocytogenes* From Meats Using Fluorescent-Tagged Primers And Multi-Locus Sequence Typing**

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**Presentation Subject Area: Biological Sciences**

*Listeria monocytogenes* is an important psychrotrophic foodborne pathogen. Despite stringent sanitation methods by food industries, it is a frequent contaminant in post-processing facilities manufacturing ready-to-eat (RTE) meats causing numerous foodborne outbreaks and deaths. Improved detection methods for *Listeria monocytogenes* will enable processors to implement their more frequent use as a screen to verify the safety of food products and environmental surfaces. Discrimination of the pathogenic strains is crucial in pinpointing sources of contamination in order to prevent recurrent outbreaks.

Our objective is to develop and optimize the Ampliflour Uniprimer™ real-time PCR technique for rapid and specific detection of *L. monocytogenes* from meats following primary and secondary enrichment and delineate strains of *L. monocytogenes* using multi-locus sequence typing.

For real-time PCR detection, primers were selected for a short 110-bp amplicon that targets the hemolysin gene (*hlyA*) specific for *L. monocytogenes* and optimized using an Opticon II thermal cycler. Primers were designed from a consensus multiple alignment sequence of 40 known *hlyA* genes in Gene Bank using the Vector NTI suite primer analysis program. Antibiotic resistant strain of *L. monocytogenes* ScottA-2 was inoculated by serial dilution in raw/processed meats at 10<sup>6</sup> to 10<sup>0</sup> cfu/gm. Real-time PCR was performed following primary and secondary enrichment of the inoculated products.

In both raw and RTE meats we were able to detect *L. monocytogenes* (after enrichment) when inoculated as low as 1 cfu/25gm of meat with a maximum detection time of 2 days including primary and secondary enrichments. No amplification was obtained with negative controls or samples having non-pathogenic species of *Listeria*. Real-time PCR targeting the 16s rRNA gene yielded a greater fluorescence at lower threshold cycles due to six copies of the 16s rRNA gene per *Listeria* genome. The same Ampliflour Uniprimer™ can be used to detect different targets simply by changing a required sequence added onto the 5'-end of one primer.

Multilocus sequence typing was performed using 16 food isolates of *L. monocytogenes* based on loci in the hemolysin (*hlyA*), internalin (*inlA*), and positive regulatory factor (*prfA*) genes. PCR products of 560bp, 575bp, and 590 bp, respectively, were amplified for each isolate, sequenced (OSU Core Facility), joined to form an artificial gene using the neighbor joining method of Vector NTI suite, and compared by multiple sequence alignment and Clustal analysis. The 16 isolates were identified and differentiated into 9 groups based on the degree of divergence between the strains. This method was rapid, economic, and could easily be automated for differentiating isolates. This method is based on specific gene sequence and may provide an alternative method than PFGE or ribotyping for differentiating strains.

## **Media In Globalization: Tool Of Democracy Or Tool Of Imperialism?**

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**Presentation Subject Area: Social Sciences**

Media are sources of information. Information is power. Once people are exposed to information, they are able to make informed decisions about the powers that govern their lives, which is evident in a democratic state. Thus, media and democracy exist in a symbiotic relationship. The purpose of this paper was to research how media can be used to promote democracy or succeed in promoting its counterpart ‘imperialism. These opposing views address various questions such as: how can media serve as a tool of democracy when they are profit-making entities? How can the public be objectively informed when the media are often controlled by the government in power or the owners of the vehicles of media? Does media mean cultural homogeneity or is it truly, purely spreading information for the purpose of giving power to the people? My research was intended to present information from both sides of the argument to spur future research. The importance of such information is evident in the way that the Iraqi state forms its new government. More specifically, it is important to the extent in which decision makers will rely on the media to distribute information to the people and how the people will use the media for information.

## **Effects of Subtoxic Levels of Manganese on Dopamine Uptake in SK-N-SH Cells**

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**Presentation Area: Biomedical Sciences**

Chronic occupational and environmental exposure to heavy metals such as manganese has been linked to the development of neurological disorders. Chronic or excess exposure to manganese leads to “*manganism*”, where an abnormal concentration of manganese is located in the brain, specifically in the basal ganglia. These neurological disorders usually mimic Parkinsonism, which has lead us to focus on alterations in the dopaminergic system. In this study, neurochemical effects of subtoxic levels of manganese were examined. Human undifferentiated neuroblastoma SK-N-SH cells were maintained in culture medium containing RPMI 1640 supplemented with 10% fetal bovine serum and 1% penicillin/streptomycin. SK-N-SH cells were plated at in 24-well plates for dopamine (DA) uptake studies 24-72 hours previous to experiments. Uptake assays were carried out by exposing cells to one of 6 concentrations (0.01 $\mu$ M to 100 $\mu$ M) of MnCl<sub>2</sub> over a

period of 1, 3, 6, 24 and 48 hours. Media was removed and 100 $\mu$ L of assay buffer (modified Krebs buffer, maintained at pH 7.4 with 25mM HEPES) was added to the cells exposed to MnCl<sub>2</sub> and control wells. 100 $\mu$ L of GBR {50nM} and Mazindol {1 $\mu$ M} were added to remaining wells respectively with 400 $\mu$ L of assay buffer plus [<sup>3</sup>H] dopamine {20nM} to all 24 wells. GBR and mazindol were used because GBR is a dopamine uptake inhibitor while mazindol is a dopamine and norepinephrine uptake inhibitor. Reaction was terminated when media was removed and rinsed with ice-cold 0.9% NaCl after 20 minutes on a plate shaker. Cells were removed with 150 $\mu$ L of trypsin and added to 5mL of scintillation cocktail. [<sup>3</sup>H]Dopamine uptake was quantitated by liquid scintillation spectrophotometry. Results showed MnCl<sub>2</sub> concentrations at 1.0 $\mu$ M, 10 $\mu$ M and 100 $\mu$ M were time dependant in regards to increasing or decreasing DA uptake. Statistical analysis was ran using the Kruskal-Wallis test to show no significance between concentrations with 6, 24 and 48 hours of exposure time; however, exposure time is significant according to the Kruskal-Wallis test with a P=0.0273. 1.0 $\mu$ M of MnCl<sub>2</sub> increased DA by 55% at 6 hours, decreased uptake by 33% after 24 hour of exposure and decreased DA uptake by 14 % after 48 hours of exposure. After 6 hours of exposure to 10 $\mu$ M of MnCl<sub>2</sub>, DA uptake was increased by 54%, and decreased by 22% when exposed for 24 hours. 100 $\mu$ M of MnCl<sub>2</sub> increased DA uptake by 90% when exposed after 6 hours. It was concluded that MnCl<sub>2</sub> concentrations at 1.0 $\mu$ M, 10 $\mu$ M and 100 $\mu$ M showed a biphasic effect in regards to affecting DA uptake in the SK-N-SH cells. As exposure time increases, DA uptake into the SK-N-SH cells decrease, possibly due to increased cell death. Additional studies are underway to determine the cause of this reduction in dopamine uptake with increasing time.

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## Financial Education Program Evaluation

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**Presentation Subject Area: Environmental Sciences**

“Money 2000” and Beyond is a financial education program established in order to help individuals or families increase their financial well-being (Porter, 1999). The program educates participants to manage their personal finances. The goal is to improve participant's financial behaviors. The participants enrolled in the Money 2000 program, received educational programs, newsletters and one-on-one assistance, also, they were encouraged to set personal financial goals in terms of increased savings and/or reduced household debt. The Oklahoma corporative service conducted the research to evaluate the impact of the Money 2000 program on the changing participant's financial behavior and achievements financial goals. Forty-four of the 441 participants or 12% completed the Money 2000 program two-page questionnaire. Questions regarding the respondent's financial practices were evaluated using five-point scale from never (1) to always (5). Other questions such as the participant's current financial position were open-ended. A frequency analysis was used to evaluate responses to determine what factor affected participants' debt reduction and/or saving increments. From the study, it was identified that respondents who used the Money 2000 information did manage their household expenses and were able to decrease debt and increase saving. Variables that made a significant difference included having a financial plan, setting long-term goals, feeling confident in one's ability and limiting the use of the checking account.

## **From Mineral Grain To Mountain Range: Insights Into The Geologic History Of Complexly-Deformed Menderes Massif (Western Turkey)**

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**Presentation Subject Area: Biological Sciences**

The Menderes Massif, which covers an area of >40,000 km<sup>2</sup> in Western Turkey, is a prime example of an area that experienced a complex, multi-stage geologic history. The Massif is considered as a metamorphic core complex, the result of extreme extensional deformation in continental regions. Mineral grains in rocks from this mountain range record multiple events, including a Pan-African history (~500 Myr), Alpine metamorphism (~45-30 Myr), Eocene-Oligocene compression (~30-20 Myr). However, when the post-collisional extension that created the Menderes Massif initiated is controversial. To identify if Menderes Massif garnets record this polymetamorphic history, the OSU electron microprobe was used to X-ray element map and identify zoning types. Electron microprobe analysis is used for mineral identification, describing and classifying rocks. Its spatial resolution makes it a powerful tool for studying zoned minerals. Garnet is used as a chemical recorder in which the pressure-temperature (P-T) evolution of a sample is recorded by variations in Fe, Mg, Mn and Ca. These zoned crystals show the chemical reaction history of the Menderes Massif, thus provide insight into how rocks evolved as the Massif was created. Three major zoning types are identified in Menderes Massif garnets: polymetamorphic zoning (compositions recording more than one stage of garnet growth), retrograde zoning (compositions affected by diffusion), and prograde zoning (preserves compositions during growth). For example, one southern Menderes Massif sample has garnet + biotite + muscovite + chlorite + plagioclase + ilmenite + zircon + allanite + monazite + quartz. X-ray element maps of the garnets show a discontinuous Mn increase not found near minerals characteristic of retrogression, defining a ~30- $\mu$ m plateau. The Mn increase appears at the same location as a sharp Ca decrease and Mg increase. The profile leaves open the possibility the garnets grew during two stages and/or experienced a change in bulk composition during rim growth. Another garnet from the Kuzey Detachment, which bounds the northern edge of the Central Menderes metamorphic core complex, shows no zoning in Mn, Fe, Mg, or Ca, and has a 483 $\pm$ 5 Myr monazite inclusion. This result indicates the sample experienced significant diffusional relaxation since its time of formation. Approximately five other Menderes Massif garnets show preserve prograde zoning in Mn, suggesting that no one mechanism for garnet formation in the Massif should be invoked. Garnet-based P-T conditions are frequently used to evaluate and develop models for the tectonic evolution of the Menderes Massif. If the garnets are detrital, polymetamorphic, or developed during a previous metamorphic event, using their compositions in combination with matrix minerals generates misleading conditions and erroneously constrained tectonic models.

## **Genome-Wide Analysis Of Rat $\hat{A}$ - And $\hat{A}$ -Defensin Gene Clusters**

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**Presentation Subject Area: Biological Sciences**

Defensins comprise a large family of antimicrobial peptides produced by phagocytes and mucosal epithelial cells in response to infection. These peptides are further divided into three groups, namely  $\hat{a}$ -,  $\hat{a}$ - and  $\hat{e}$ -defensins, with each group characterized by a unique six-cysteine motif. To identify the entire repertoire of the defensin gene family in the rat, we have developed a computational strategy to search through the expressed sequence tag (EST) and the largely finished rat genome sequence databases. Such comprehensive

searches led to discovery of a total of 13  $\alpha$ -defensins and 41  $\beta$ -defensins with each exhibiting a characteristic six-cysteine spacing pattern at the C-terminus. Assembly of the bacterial artificial chromosome (BAC) clones containing defensins revealed that all  $\beta$ -defensin genes are densely clustered on four chromosomes with each cluster spanning  $<810$  Kb. All 13  $\alpha$ -defensins are located within a  $\beta$ -defensin cluster on chromosome 16. Moreover, analysis of tissue expressions of representative defensin genes indicated that each gene cluster showed a distinct expression pattern with the genes located within a cluster expressed in a similar fashion. Functional analysis of such an array of host defense molecules will lead to a better understanding of the molecular mechanisms of disease resistance and provide important leads for the development of novel antimicrobial drugs.

## **Inverting Finite Radon Transforms**

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**Presentation Subject Area: Mathematics**

An operation that takes a function on points to a function on lines is a Radon Transform. An example of this is the X-Ray transform, which takes the density function of 3 spatial variables inside a body into an intensity function on lines passing through that body. Inversion of the x-ray transform would lead to construction of the density function from the intensity data on the x-ray film. The Finite Radon Transform is a discrete analogue of this situation. A Finite Radon Transform takes a function on a finite point space  $X$  into a function on a finite collection  $Y$  of lines in  $X$ . Characterization of the range of the finite transform and inversion of the transform are discussed. Two examples are computed in detail, for the complete graph on  $n$  vertices and for the vector space over a finite field  $F$ . For the complete graph on  $n$  vertices, an admissibility condition is obtained, and an explicit count of the number of sets of  $n$  lines that allow inversion is made. For the vector space over the finite field  $F$ , a closed formula for determining which subsets of lines allow inversion and how many such sets exist is found.

## **The Role Of Gender In The Organization Of Memory**

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**Presentation Subject Area: Social Sciences**

The research investigated the hypothesis that memory organization for everyday knowledge may depend on whether the individual is male or female. Prior research has shown that words that are frequently experienced are remembered better and responded to faster than words that are infrequently experienced (Chalmers & Humphreys, 1998; Guttentag & Carroll, 1994; Scarborough, Cortese, & Scarborough, 1977). We propose that an individual's gender is an important factor in determining the individual's everyday life experiences, specifically the activities in which one participates and the topics with which one becomes knowledgeable. Because we view the differences between male and female performance as stemming from everyday life experience, we refer to the effects as gender differences rather than biological sex differences.

The results of two experiments show effects of gender in the organization of human memory. Each experiment investigated how male and female participants remembered or responded to proper names (e.g., John, Mary). In Experiment 1, male and female participants were asked to generate from memory as many names as possible for males and females. The results showed that of the names generated by male participants, a larger percentage of the names were for males than for females. Female participants generated a larger percentage of names for females than for males. In Experiment 2, male and female participants were shown four lists of proper names. Each list contained 20 names. Each name in each of the four lists was presented for two and a half seconds. Two lists were high frequency names (i.e., John, Mary). Two lists were low frequency names (e.g., Seymour, Regina). For a given block, the names were all male or all female. Following the presentation of each block, participants were instructed to write down as many names as they could remember. The results showed that male participants remembered more male names than female names, and female participants remembered more female names than male names.

These results suggest that the content of an individual's memory is influenced by the individual's gender. We propose that males have more male-specific knowledge content than females, and females have more female-specific knowledge content than males. The implications of these results include the possibility that gender-related differences in knowledge content may impact memorability for gender-specific information in other memory tasks.

## **Selection Of An Aptamer Probe Against F1 Capsular Antigen Of Yersinia Pestis; A Potential Biological Warfare Agent**

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**Presentation Subject Area: Biomedical Sciences**

*Yersinia pestis*, the causative agent of plague, is one of the CDC 'category A' agents of priority for biodefense interests. With the advantages of availability, ease of bulk production, aerosolization and rapid spread, *Y. pestis* would be a potential threat as biological warfare agent. A successful response to a bioterrorist threat requires tools to identify the pathogen involved. However, the initial signs and symptoms of many agents considered biothreats are nonspecific and resemble those of common infections. There are no effective warning systems to detect an aerosol release of plague. Thus development of a rapid, highly sensitive, specific, and feasible diagnostic approach for identification of *Y. pestis* is a high priority. The F1 capsular antigen is an abundant protein that forms an aggregative capsule-like envelop on the outer surface with copy number likely exceeding 105/bacterium. The F1 is highly specific and an ideal signature target for *Y. pestis* as it is encoded by a gene in pMT1 virulence plasmid present only in *Y. pestis*. Detection of pathogens using aptamer beacons is novel approach wherein aptamer-target specifically interact with non-covalent interactions other than Watson-Crick interactions. Aptamers are short DNA or RNA or modified oligomers isolated from a complex library of 10<sup>11</sup> to 10<sup>15</sup> synthetic oligonucleotides by the systematic evolution of ligands by exponential enrichment (SELEX), an iterative process of absorption, recovery, and reamplification. The selection of a specific aptamer against any target requires a pure target during SELEX process. In the present study, the F1 capsular antigen and pH6 antigen or adhesin were co-purified by chromatography due to their interaction on the surface of the bacterium. The pH 6 antigen is encoded by *psaA* gene. The F1 and pH 6 antigens were characterized by using monoclonal antibody in western blotting, protein fingerprinting and MALDI-TOF mass spectrometry. In future work, we will knockout the *psaA* gene, isolate pure F1 antigen, and use the SELEX process to select a highly specific DNA aptamer against

F1 antigen of *Y. pestis*. An aptamer specific to F1 would be helpful for the rapid detection of *Y. pestis* in aerosol or other sources of infection.

## **Potential Influence Of A Fish Introduction On The Sex Ratio And Size Of Damselfly Larvae Of The Enallagma Complex.**

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**Presentation Subject Area: Biological Sciences**

People frequently stock ponds and wetlands with fish in an attempt to improve the perceived recreational value of these waters. The influence of such stocking events on preexisting invertebrate populations has not been extensively investigated, although fish predation could significantly change community structure. A previous laboratory study that examined the effects of sex on the behavior of larvae of a damselfly (*Ischnura verticalis*) indicated that male larvae spent more time moving and moved greater distances than did females, which could result in differential susceptibility to capture. This could have serious implications for damselfly populations subjected to predation by introduced fish, since a skewed sex ratio could threaten population viability. The purpose of the current study is to determine if damselfly larvae belonging to the *Enallagma* complex exhibit differential susceptibility to fish predation between males and females. Damselfly exuviae were sampled approximately every 48 h from mid-May to mid-September from a quarter-acre pond both before and after the addition of green sunfish (*Lepomis cyanellus*). A second quarter-acre pond that remained fishless was similarly sampled. Artificial emergence structures were placed in each pond and exuviae found on these screens were collected and sorted. For approximately every 4th sampling date, all exuviae of individuals belonging to the *Enallagma* complex were sexed and their head capsule width was measured. From these samples, it was determined that between 30 and 60 individuals must be examined in order to get a sex ratio representative of the population. The average head capsule size of damselfly larvae emerging from these ponds was reduced after the addition of fish, with a greater decrease apparent in female larvae. However, no significant difference in sex ratio was apparent. Laboratory experiments are being conducted to more specifically characterize sex-specific differences in susceptibility to predation that may exist in this particular genus. The results of this study may prove useful in the management of aquatic habitats, since the introduction of fish to a previously fishless system may threaten the viability of some damselfly populations and potentially alter aquatic invertebrate communities.

## **Generalized SVRC-QSPR Predictions Of Saturated Vapor Pressure And Phase Densities**

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**Presentation Subject Area: Physical Sciences & Technology**

In response to the stringent economic and environmental standards, the chemical industry has been exploring ways to develop compounds that seamlessly combine cost considerations, environmental fate and process safety, in addition to desirable physical, chemical and thermodynamic attributes. Computer aided molecular design (CAMD) deals with development of these designer chemicals. Thousands of new molecules, most of

whose properties are unknown, are generated using genetic algorithms. In most cases, promising subsets of these molecules are synthesized and then tested for their properties. Clearly, this is an expensive and time-consuming approach. An alternative approach is to develop efficient and reliable predictive models based on the chemical structure of the molecules.

In this work, we develop Quantitative-Structure-Property Relationships (QSPR) for predicting the input parameters for the scaled-variable-reduced-coordinate (SVRC) framework, which provides reliable predictions for pure-fluid saturation properties. Specifically, we demonstrate the efficacy of the SVRC in providing accurate vapor pressure and phase-density predictions of diverse molecular species using QSPR parameter generalizations.

In general, the SVRC-QSPR model is capable of predicting the saturation properties considered for over 50 fluids with average errors of less than 1%.

## **The Reusable Electrode Well: A New Tool For Environmental Monitoring**

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**Presentation Subject Area: Environmental Sciences**

Electrical resistivity tomography (ERT) provides useful hydrogeologic data but is difficult to integrate into current site characterization plans designed for monitoring well data. Methods have been developed to install ERT electrodes with direct push equipment; however, these do not allow for cable extraction and reinstallation in the same location. If a cable were damaged, an entirely new installation would be required. The use of a slotted PVC casing will allow a new cable to be added to the well without fear of formation collapse or inability to retrieve the cable. In this new method, a slotted PVC liner is installed and filled with a conductive material. An electrode array is then added using a nonconductive rod to push the cable into the borehole. The cable can then later be retrieved by simply pulling it out. This set up allows several arrays of wells to be installed and the use of fewer cables, which are swapped between the various boreholes. This will drastically reduce the cost of doing full site 3-D borehole surveys and allow greater versatility in the types of surveys conducted.

## **Salivary Tnf- $\alpha$ And Ifn- $\gamma$ Response To A Collegiate Football Game And Playing Season.**

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Some aspects of cellular immune function have been shown to decline in response to a competitive athletic event or season, while heavy athletic training appears to be associated with systemic inflammation as

evidenced by elevated serum inflammatory cytokines. **PURPOSE:** To assess the influence of participation in a competitive collegiate football season and a single football game on salivary inflammatory cytokine response. **METHODS:** Saliva was collected from NCAA Division I football athletes before (T1 = resting pre-season) and after (T4 = resting, 1 week post-season) a competitive collegiate football season, and 24 hrs before (T2 = resting pre-game) and after (T3 = within 1 hr post-game) a single competitive football game during mid-season. Unstimulated saliva was collected for ten minutes while subjects 'drooled' into sterile tubes. Samples remained on ice until centrifugation and were then stored at -80°C until analysis. Samples were analyzed for IFN- $\alpha$  and TNF- $\alpha$  using ELISA. Subjects were grouped by number of downs to assess the influence of a single game on salivary cytokines (Grp1 = 0, Grp 2 = 1-10, Grp 3 = 11+ downs). **RESULTS:** No differences existed among groups at any time point for salivary IFN- $\alpha$  and TNF- $\alpha$ ; therefore groups were collapsed for further statistical analysis. Participation in a competitive football game had no influence on salivary TNF- $\alpha$  (N = 12, T2 =  $4.3 \pm .92$ , T3 =  $5.9 \pm 2.6$  pg/mL-1;  $p > 0.05$ ); however, there was a tendency for an increase in salivary IFN- $\alpha$  levels (N = 13, T2 =  $14.9 \pm 3.7$ , T3 =  $32.6 \pm 8.8$  pg/mL-1;  $p = 0.07$ ). Resting salivary TNF- $\alpha$  concentrations tended to increase over a competitive collegiate football season (N = 11, T1 =  $3.68 \pm 0.64$ , T4 =  $7.9 \pm 2.1$  pg/mL-1,  $p = 0.058$ ); whereas resting salivary IFN- $\alpha$  was significantly elevated after the competitive season (N = 16, T1 =  $15 \pm 2.8$ , T4 =  $40.5 \pm 7.5$  pg/mL-1;  $p = 0.006$ ). **CONCLUSION:** The observed elevation in salivary cytokine levels after a competitive collegiate football season indicate a chronic systemic or oral inflammation and are similar to changes observed in serum consequent to heavy training.

## **Effects Of Dietary Iron In Bone Micro-Architecture In Female Rats**

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**Presentation Subject Area: Biological Sciences**

**Problem Statement:** Two major health problems faced by the world today are iron intakes leading to iron deficiency or iron excess and osteoporosis. Iron deficiency is a worldwide health problem, and iron excess is increasingly a risk with the availability of nutrient supplements and with national food fortification policies. World wide, approximately one-half of all women are affected by osteoporosis. Hence the diagnosis, treatment, and monitoring of osteoporosis as well as other skeletal diseases have become a prominent health care and research issue. Bone strength is reduced in osteoporosis by reduction of structural integrity and loss of bone mass. Thus, the research question for the project was does dietary iron affect bone structure and strength at different points in the life span and in different ovarian hormone status categories.

**Methods:** One hundred and twenty four weanling Sprague-Dawley female rats were randomized to treatment (young mature, ovariectomized or sham-operated) and fed one of four levels of iron (6, 12, 35 or 150 ppm) for 15 or 27 weeks. Young mature rats (N=40) were killed at 18 weeks of age and bones were collected. At 18 weeks of age the remaining rats were either ovariectomized to mimic menopause or sham-operated as controls. At 30 weeks these animals were killed and bones were collected. Cleaned fifth lumbar vertebrae were scanned for microarchitecture (Micro-CT 40, SCANCO MEDICAL AG, Zurich, Switzerland) and strength analyses were performed.

**Results:** In young mature rats, BV/TV was significantly lower for those fed 6 or 12 ppm Bone volume/Total volume (BV/TV) of rats was measured which describes the amount of specific region occupied by bone. BV/TV was significantly lower for rats fed 6 or 12 ppm than those fed 35 or 150ppm iron. The structural model index (SMI), a measure of a bone's relative rod-like or plate-like properties, was greater in the 6ppm vs 35 or 150 ppm diets such that the higher iron diets produced more plate-like vertebral structures. The marginally low diet (12 ppm) also had less plate-like structures than the 150 ppm. The average number of

trabeculae (TB\_No) per mm was less in rats fed 6 ppm iron than those fed 35 or 150ppm iron and those fed 12ppm was significantly lower than 150ppm. The average separation or air space between trabeculae (Tb.Sp) was significantly greater in low iron diet rats (6 or 12 ppm) than in high iron diet rats (35 or 150ppm). In the sham-operated and ovariectomized animals, effects of diet were found for force, stiffness, and Von Mises stresses. Effects of ovariectomy were also found for stiffness. In architectural characteristics ovariectomy also affected SMI and connectivity density.

Conclusions: Findings show iron content has an effect on the bone architecture and strength. In young mature animals bone strength is increased as dietary iron increases and bone becomes more plate like. However, when these diets are continued the highest iron levels appear to be detrimental. This detrimental effect occurs in both ovariectomized and sham operated animals.

## **Relationship Of Free IGF-I With Total IGF-I, IGFBP, And Steroids In Follicular Fluid Of Dominant And Large Subordinate Follicles Of Preovulatory Cattle**

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**Presentation Subject Area: Biological Sciences**

The objective of this study was to evaluate if changes in follicular fluid (FFL) insulin-like growth factor binding proteins (IGFBPs) and steroid levels are associated with changes in free IGF-I in dominant and large subordinate follicles of preovulatory cattle. Estrous cycles of non-lactating dairy cows (n=15) were synchronized with two injections of PGF2 $\alpha$  11 d apart. Follicular growth was monitored daily via transrectal ultrasonography 5 d before the second injection of PGF2 $\alpha$ . FFL from the dominant and largest subordinate follicles was collected via transvaginal aspiration at 24 or 48 h post PGF2 $\alpha$ . FFL concentrations of various IGFBPs, free and total IGF-I, and steroids were determined using one-dimensional SDS-PAGE, free IGF-I immunoradiometric assay and radioimmunoassays, respectively. Data were analyzed using the MIXED procedure of SAS and differences in treatment means were evaluated using LSMEANS with the PDIF option. Pearson correlation coefficients were also calculated. FFL free IGF-I concentrations were 9-fold greater (P<0.0001) in dominant (18.6 ng/mL) than in the large subordinate (2.2 ng/mL) follicles. Total IGF-I concentrations did not differ (P>0.10) among follicle types or correlate with free IGF-I. The calculated percentage of free IGF-I was greater (P<0.001) in dominant (22.2%) than in subordinate (4%) follicles. Levels of IGFBP-2, -4, and -5 were significantly greater (P<0.005) in large subordinate than in dominant follicles. Free IGF-I was not significantly correlated with IGFBP-3 but was negatively correlated (P<0.01) with IGFBP-2 (r=-0.53), -4 (r=-0.51), -5 (r=-0.52), and positively correlated with estradiol (r=0.73) and androstenedione (r=0.56) levels. We conclude that greater intrafollicular free IGF-I concentrations (because of decreased levels of low molecular weight IGFBP) may enhance steroidogenesis in preovulatory dominant follicles of cattle.

## **Effects Of Subtoxic Mercury Levels On [<sup>3</sup>H] Dopamine Uptake**

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## **Presentation Area: Biomedical Sciences**

Mercury exhibits toxicity in the central and peripheral nervous systems due to its oxidative properties. Since prior research has focused on the effects of acute exposure at higher, toxic concentrations, this project will evaluate the effects of subtoxic exposure over varied time points. The SK-N-SH cell line was utilized to examine mercury toxicity due to their similarity to dopaminergic neurons of the substantia nigra and therefore reflect what is to be expected with in vivo studies. SK-N-SH cells are routinely used in studies as a model of neurotoxicity, and this cell line expresses both noradrenergic and dopaminergic transporters. [<sup>3</sup>H] Dopamine uptake was used as an index of toxicity because excess dopamine may play an important role in oxidative stress, which can result in necrotic or apoptotic cell death. To determine the %control of dopamine uptake, the cells were first treated with a range of mercuric chloride (HgCl<sub>2</sub>) concentrations for various lengths of time (1-48 h) and then incubated in the presence of 20nM [<sup>3</sup>H] dopamine for 20 minutes at room temperature. Dopamine uptake was terminated by washing the cells with 2mL of ice-cold 0.9% NaCl. When cells were treated in assay buffer at room temperature, lower concentrations (1nM-1μM) of mercury showed little to no inhibition of dopamine uptake, even over moderate time periods (6h). The same occurred with the higher mercury concentrations (100-200μM) with moderate exposure time (6h). At moderate concentrations (100nM-100μM) of mercury, significant (P = 0.0079) time-dependent effects between 1- and 6-hour exposure periods were observed. However, when cells were treated in the growth medium at 37°C for longer periods of time (24 h), a significant effect of concentration (P < 0.0001) in dopamine uptake was noted. The data from multiple exposure period mercury treatments in the growth medium reiterated the concentration-dependent effects; showing a 2.5- to 3-fold increase in dopamine uptake at lesser concentrations (10μM) across the board at all time points, while higher concentrations (100μM-500μM) resulted in severe inhibition of dopamine uptake, even at the smallest time period. The 6-hour mercury treatment data suggest significant (P < 0.0006) buffer composition effects, illustrated by the changes in dopamine uptake observed when ascorbic acid, a known free-radical scavenger, was not present in the assay buffer. In conclusion, the data from this study support that mercury cytotoxicity has more of a concentration-dependent effect than a time-dependent effect on dopamine uptake. Additional studies are being performed to investigate potential temperature- or growth medium/buffer composition-dependent effects of low-level mercury exposure on dopamine uptake, which may better represent in vivo conditions. (Supported by NIH DA13137 – D.R.W.)

## **Do Fish Use Discharge As A Cue For Spawning: Larval Fish Abundance In The Red And Washita Rivers?**

**Jason Schaffler and Dana L. Winkelman**  
**Department of Zoology**  
**Oklahoma State University**  
**Presentation Subject Area: Biological Sciences**

Lake Texoma is a 36,000 ha impoundment of the Red and Washita Rivers. We sampled larval fish in the Red and Washita Rivers during Spring 2002. Overall, we captured 12,045 larval fish representing 9 families. We found negative correlations between river discharge and abundance for only Moronidae and Cyprinidae in both rivers. Our results indicate that discharge is can account for a significant portion of the variation in larval fish abundance, where the species is adapted to spawning in a large river.

## **Ageism: Ageist Stereotypes Can Affect The Attitudes Of College Students Toward Elderly Adults**

**Darla Sherman Dr. Doug Reed**  
**McNair Scholars Program**  
**University of Central Oklahoma**  
**Presentation Subject Area: Environmental Sciences**

People automatically categorize others by three major categories: race, sex, and age. Both racism and sexism have been intensely studied, but ageism needs far more study than it has received (Cohen, 2001). There has been previous literature concerning ageism that has shown a stereotypically negative attitude toward elderly adults. The purpose of this study is to further examine whether ageist stereotypes are affecting the attitudes of college students toward elderly adults. The data we utilized was obtained from a three page questionnaire that was administered to ninety-four college students. Results from the study confirmed that elderly adults are rated significantly lower on interpersonal acceptability. The work abilities of the elderly adults were also perceived to be less than that of their younger counterparts. The study provided evidence that ageist stereotypes do exist in the attitudes the college students held toward the elderly adults, however, time and sample restraints limited the research. More in depth study still needs to be done concerning the existence, cause, and effect of an ageist attitude toward elderly adults.

## **Use Of Q-Methodology To Assess Attitudes Toward Nutrition In Black Female Collegiate Athletes**

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**Presentation Subject Area: Education**

The attitudes that athletes hold toward nutrition and wellness are important factors in their applied lifestyle practices. Good nutrition and healthy lifestyle are critical to successful athletic performance, however, engaging in these practices is not always a part of athletic preparation. The purpose of this study is to understand the attitudes of black female athletes toward nutrition and eating practices in order to better help those who influence these young women in their choices. Q-methodology was used to obtain the opinions of the sample from an individual viewpoint. Over twenty black female collegiate athletes were asked to identify their attitudes and perceptions toward wellness issues including nutrition, body image and motivation in their sport. After participants sorted 40 items concerning nutrition, body image, and motivation the sorts were correlated, the matrix was factor analyzed and z-scores were calculated on each statement in the resultant three factors. Three belief systems were interpreted from these participants.

## **Bone Reversal Properties Of Soy And Fructooligosaccharide In Ovarian Hormone Deficiency.**

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**Presentation Subject Area: Biological Sciences**

The study examined the efficacy of soy and fructooligosaccharide (FOS), a non-digestible carbohydrate known to support the growth of beneficial bacteria in the gut, on reversal of bone loss in ovariectomized (ovx) osteopenic rats. Sixty-four 9-mo old Sprague-Dawley rats were either sham-operated (sham) or ovx and fed a standard casein-based diet for 90 days during which time the ovx rats significantly lost bone as verified by whole body bone mineral density (BMD) and content (BMC) using dual-energy x-ray absorptiometry. Thereafter, the ovx rats were randomized into 4 treatment groups: ovx (control), ovx + soy, ovx + 5% FOS, ovx + soy + 5% FOS and treatments continued for 125 days. Treatment effects on BMD and BMC of the tibiae and the lumbar vertebrae are presented below.

| Group     | Left tibia           |                     | Third lumbar         |                      | Fourth lumbar        |                      |
|-----------|----------------------|---------------------|----------------------|----------------------|----------------------|----------------------|
|           | BMC                  | BMD                 | BMC                  | BMD                  | BMC                  | BMD                  |
| Sham      | 0.3584 <sup>a</sup>  | 0.1993 <sup>a</sup> | 0.1279 <sup>a</sup>  | 0.2264 <sup>a</sup>  | 0.1465 <sup>a</sup>  | 0.2342 <sup>a</sup>  |
| Ovx       | 0.3103 <sup>c</sup>  | 0.1825 <sup>c</sup> | 0.1071 <sup>c</sup>  | 0.1986 <sup>c</sup>  | 0.1189 <sup>c</sup>  | 0.2055 <sup>c</sup>  |
| Soy       | 0.3423 <sup>ab</sup> | 0.1908 <sup>b</sup> | 0.1135 <sup>bc</sup> | 0.2046 <sup>bc</sup> | 0.1273 <sup>bc</sup> | 0.2124 <sup>bc</sup> |
| FOS       | 0.3269 <sup>bc</sup> | 0.1892 <sup>b</sup> | 0.1201 <sup>ab</sup> | 0.2100 <sup>b</sup>  | 0.1341 <sup>b</sup>  | 0.2183 <sup>b</sup>  |
| Soy + FOS | 0.3221 <sup>bc</sup> | 0.1887 <sup>b</sup> | 0.1147 <sup>bc</sup> | 0.2088 <sup>b</sup>  | 0.1331 <sup>b</sup>  | 0.2181 <sup>b</sup>  |

*Values in a column not sharing a superscript letter are significantly different from each other (P<0.05).*

Although the above data indicate that soy and FOS each improve tibial and vertebral BMD and BMC, their combination do not exert a greater bone protective effects.

## Performance Modeling Of Supply Chain Networks

**Sandeep Srivathsan and Ananth Krishnamoorthy, Sarath Kureti.**  
**Department of Industrial Engineering and Management**  
**Oklahoma State University**  
**Presentation Subject Area: Physical Sciences & Technology**

A supply chain network consists of nodes representing suppliers, production points, warehouses, distributors, retailers or customers. Considerable research has been done in developing performance evaluation and optimization models for supply chain networks. Performance evaluation models have been mainly restricted to the application of discrete event simulation. Very little research has been published that focuses on performance evaluation using queueing models. This is the focus of an ongoing research effort in the Center for Computer Integrated Manufacturing at OSU.

We consider a supply chain network with two retailers and a single stage manufacturing unit. In this model, orders arrive at the retailers and consume finished products. This triggers a series of actions at the different nodes of the supply chain.

We present simulation and queueing network models of supply chain networks. The simulation model was developed using Arena, a commercial software package provided by Rockwell Software. To develop analytical models of supply chain networks, we extend the production-inventory network models developed by Shankar Sivaramakrishnan as part of his PhD dissertation at OSU. The extensions model features like distribution and transportation. Our analytical models are based on two-moment queueing approximations that have been successfully applied to a wide variety of manufacturing systems.

We present some numerical examples that compare the results of the queueing models with those obtained using simulation. We also present some directions for future research in this area.

## **Performance Modeling Of Supply Chain Networks**

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## **A Multi-Structure Delay Model for Real-Time Multimedia over IP**

**Christopher White and Edward Daniel, Josh Raymond, Anthony Calbone, Keith Teague**  
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**Oklahoma State University**  
**Presentation Subject Area: Physical Sciences & Technology**

Packet network data experience varying delays, resulting in inter-arrival jitter. This results in degraded performance for real-time multimedia communications applications when delays are large or unaccounted for in the receiver application. This paper examines modeling and simulation of network delay for real-time communications applications. We examine the multi-structure characteristics of network delay and develop a model for simulation of jitter that accounts for both short term and long term aspects of network behavior. The multi-structure model is validated by both a probability density approximation comparison as well as the Kolmogorov-Smirnov goodness of fit test.

## **The Relationship Among Ndvi, Nitrogen, And Irrigation Rate On Bermudagrass**

**Xi Xiong**

**Department of Horticulture & Landscape Architecture**

**Oklahoma State University**

**Presentation Subject Area: Biological Sciences**

Turfgrass managers commonly use visual ratings of turfgrass status to schedule irrigation and fertilizer applications. Visual ratings are subjective and also require trained, experienced evaluators. By contrast, optical detectors provide an unbiased, highly consistent method for turfgrass evaluation that requires minimal training and experience. Optical detectors measure the irradiance reflected from a turfgrass canopy which can be used to calculate vegetation indices. Vegetation indices (VI), a combination of observations from two or more spectral wavelengths have greater sensitivity to changes in plant greenness than the response from a single wavelength. Among them, normalized difference vegetation index (NDVI) defined as  $(R_{nir} - R_{red}) / (R_{nir} + R_{red})$  is most commonly used. Red reflectance increases and near infrared reflectance decreases when plant greenness declines. Therefore, the comparison of red and NIR wavebands tends to be effective for measuring plant greenness. NDVI ranges from 0.0 to 1.0, with higher values associated with greater density and greenness of the plant canopy, and bare soil values close to zero. The objective of this research is to detect the relationship among irrigation, fertilizer and NDVI on bermudagrass and ultimately develop empirical prediction equations to guide fertilizer and irrigation management using NDVI as an indicator. This research was designed to use a hand-held GreenSeeker sensor which measures NDVI to detect water status and N status on bermudagrass. The study was conducted as a three-factor split-plot experiment for a randomized complete block design with two levels of factor A — cultivars 'Yukon' and 'Riviera', three levels of factor B — irrigation rate at 2.54 cm/week (1 inch/week), 1.27 cm/week (0.5 inch/week) and 0.63 cm/week (0.25 inch/week), and six levels of factor C — nitrogen rate at 0 (control), 12, 24, 36, 48, and 60 kg ha<sup>-1</sup> per month. In 2003 from May to October, NDVI, soil moisture, clipping moisture, tissue nitrogen were measured every two weeks, tissue chlorophyll concentration was measured every six weeks. The result is to be discussed.

## **Genomic Comparison Of Plant Pathogenic And Non-Pathogenic Serratia Marcescens Strains Using Suppression Subtractive Hybridization**

**Quan Zhang and U. Melcher, B.D. Bruton, S. D. Pair, F. Mitchell, and J. Fletcher**

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**Presentation Subject Area: Biological Sciences**

The causal agent of cucurbit yellow vine disease (CYVD) was identified as the cosmopolitan bacterium *Serratia marcescens* (Sm). Phenotypic comparison of CYVD-associated Sm strains with non-phytopathogenic strains showed significant heterogeneity. To identify the genetic changes responsible for pathogenicity related phenotypes, we used a suppression subtractive hybridization strategy. Sm strain Z01-A, isolated from CYVD-affected zucchini, was used as the tester, whereas Sm rice endophytic strain IRBG 502, 90% of whose genome is homologous to that of Z01-A by DNA-DNA hybridization, was used as the driver. Sequences unique to pathogenic strain Z01-A were dot-hybridized to other pathogenic and non-pathogenic strains to obtain truly pathogenicity specific sequences. Among them one sequence, designated a79, was used to design a specific primer capable of discriminating between Sm strains causing CYVD and those from ecological niches.

