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## **Experimental Vectors of *Serratia Marcescens*, Causal Agent of Cucurbit Yellow Vine Disease**

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Cucurbit yellow vine disease (CYVD) causes yellowing, rapid wilting and death of susceptible cucurbit plant hosts. The causal agent of CYVD, *Serratia marcescens*, colonizes the host plant phloem, suggesting possible transmission by phloem-feeding insects. The squash bug, *Anasa tristis*, was previously identified as a field vector of *S. marcescens*. Various hemipteran insects, five aphid species, four leafhoppers species and one true bug, were tested for their ability to transmit *S. marcescens* using artificial feeding systems. Aphids and leafhoppers were fed on feeding sachets containing *S. marcescens* ZO1A at  $1.0 \times 10^5$  CFUs/ml. For the true bug, *Lygus hesperus*, ZO1A-amended artificial diet was placed in unstretched parafilm pouches for acquisition and inoculation. Insects were given a 24-48 hr acquisition access period (AAP) and, immediately following, a 24-48 hr inoculation access period (IAP). Thirty two percent of the sachets exposed to *S. marcescens*-fed *Exitianus exitiosus* and 75 % of the sachets exposed to bacteria-fed *Endria inimica* were positive by PCR. Thirty one percent of the pouches exposed to *S. marcescens*-fed *L. hesperus* were positive by PCR. The Aphids, *Acyrtosiphon pisum*, *Myzus persicae*, *Aphis gossypii*, *A. nerii* and *Diuraphis noxia*, and the leafhoppers, *Dalbulus maidis* and *Macrosteles quadrilineatus*, were unable to transmit *S. marcescens* to artificial sachets. These results suggest possible transmission specificity of *S. marcescens* and that *E. exitiosus*, *E. inimica*, and *L. hesperus* are experimental vectors.

## **RNA Interference Study Using Histamine Binding Protein dS-RNA in the Female Tick *Amblyomma americanum*.**

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RNA interference (RNAi), a gene silencing technique, is recently used to determine gene function by suppressing the expression of specific mRNAs. Histamine binding proteins (HBPs) have been identified and hypothesized to play a crucial role in ticks' successful feeding due to their ability to bind histamine, a major host inflammatory response. A differentially upregulated gene upon tick feeding showed a significant similarity to a DNA sequence of one HBP isoform in a different tick species, and the clone was used in the present study. The Double stranded RNA (dS-RNA) of this clone was constructed using a standard method and injected, in two separate experiments, into unfed ticks which later were infested on their host. We found a significant difference in the tick feeding pattern in the dS-RNA injected ticks compared to the control. In addition, the levels of mRNA detected both by RT-PCR and Northern blot showed a significant decrease in the experimental group. In one experiment, there were several lesions around the feeding site only in the experimental group which might reflect a local increase in the amount of the free histamine. In conclusion, RNAi may be an important tool in assessing the significance of salivary gland secreted proteins modulating responses at the tick-host interface.

## **Efficacy of Four Insecticides Under Different Temperature Regimes for Grasshoppers Damaging Leafy Greens**

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Leafy greens are grown for the fresh or processing markets. Grasshoppers are important insect pests that feed on leafy greens and may contaminate the final product thus substantially reducing the market value or forcing the processor to abandon the crop or harvested produce. This study was conducted to evaluate the efficacy of four insecticides, (insect growth regulator: diflubenzuron [Dimilin]; botanical insect growth regulator: azadirachtin [Neemix 4.5]; microbial insecticide: *Beauveria bassiana* GHA [Mycotrol] and pyrethroid: esfenvalerate [Asana]) at four different temperatures (10C, 15C, 25C and 35C). The differential grasshopper *Melanoplus differentialis* (Thomas) (Orthoptera: Acrididae) was used in the study. Individual third instar nymphs were starved for 24 hours and then provided with a collard (*Brassica acephala*) leaf treated with an insecticide. Grasshoppers with leaf tissue were placed in environmental temperature chambers with a 14 hour photoperiod. Individual temperature chambers were randomly assigned a temperature regime. After 48 hours the treated leaves were replaced with untreated leaves. Results indicated that esfenvalerate treated leaves caused the greatest mortality followed by diflubenzuron, *Beauveria bassiana* GHA and azadirachtin respectively. Diflubenzuron treated leaves resulted in mortality associated with molting deformities. Higher temperatures resulted in higher mortality for diflubenzuron and the activity of esfenvalerate was not affected by temperature.

## **Identification of Differentially Expressed Sequence Tags for Scab Resistance in Wheat Using Bulk Segregant Analysis and Suppression Subtractive Hybridization**

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Wheat head scab is a destructive disease of wheat (*Triticum aestivum*). Genome-wide analysis of gene expression in response to scab infection may lead to new gene discovery and provide insight into further understanding the genetic mechanism of wheat resistance. To enrich for differentially expressed sequence tags (ESTs) for scab resistance, suppression subtractive hybridization (SSH) was used to generate cDNA subtraction libraries from *Fusarium graminearum*-infected spikes of two bulked recombinant inbred lines (RILs) differing in scab resistance. Two bulked RILs were formed by pooling infected spikes from five F8:12 scab-resistant and five F8:12 susceptible RILs, respectively, based on their Type II resistance from four greenhouse tests. The RILs were generated from a cross between the resistant cultivar Ning 7840 and the susceptible cultivar Clark. Subtraction libraries were developed from tissues sampled 36 hours after inoculation (HAI) of the fungus and 72 HAI. There were 218 and 190 clones isolated from the forward and reverse libraries of 36 HAI, respectively, and 202 and 117 clones from the forward and the reverse libraries of 72 HAI, respectively. Eighty-six clones were randomly selected from the libraries and sequenced. Sequence homology search using the NCBI BLAST program showed they were stress-related, defense-related and signal regulation genes. Construction of an additional SSH library at 6 HAI is underway. The clones from the libraries will be used for temporal gene expression analysis with microarrays.

## **Characterization Of The mRNA Instability Element Of Ferredoxin I**

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The nuclear encoded pea ferredoxin I (Fed-1) mRNA contains a (CAUU)<sub>4</sub> repeat motif in the 5' UTR that may be responsible for Fed-1 mRNA instability in transgenic tobacco. Mutation of this (CAUU)<sub>4</sub> repeat to a randomized CAUU region results in the disruption of the dark-induced destabilization of the Fed-1 mRNA. In addition our Fed-1 mRNA half-life data suggests that replacement of the above mentioned instability element with a poly U tract also disrupts the dark-induced Fed-1 mRNA decay. Our results provide evidence that the (CAUU)<sub>4</sub> instability element is responsible for dark induced destabilization of Fed-1 mRNA. Further to discern the minimum number of CAUU units sufficient to confer the destabilization of Fed-1 mRNA in the dark, we added (CAUU)<sub>1</sub>, (CAUU)<sub>2</sub> and (CAUU)<sub>3</sub> back to the poly U substituted Fed-1 mRNA and mRNA accumulation was examined in transgenic tobacco plants. We observed that the presence of either 1 or 2 CAUU units is sufficient for partial recovery of light-regulated mRNA accumulation. However 3 CAUU units is sufficient for full recovery of light-regulated mRNA accumulation. This suggests that a minimal sequence of (CAUU)<sub>3</sub> is sufficient to confer the destabilization of the Fed-1 mRNA in the dark. Addition of more CAUU repeats to the instability element does not result in a significant increase in the light:dark mRNA accumulation ratio. We also show evidence that the CAUU sequences need not be adjacent to each other to destabilize the Fed-1 mRNA.

## **Land-use Change Surrounding the Denver International Airport Between 1990 and 2000**

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The goal of my poster is to determine the impact the Denver International Airport has had on the surrounding land-uses between 1990 and 2000. This will be done through the display of a number of maps that have been generated by correlating 1990 and 2000 population data aggregated at the census block level. The maps and analysis will be produced using Geographic Information System technologies.

## **Hydraulic Properties of Young Loblolly Pine (*Pinus taeda*) Roots**

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One of the essential functions of the roots is to supply the plant with water from the soil. When absorbed by roots, water is pulled upward by the transpiration of leaves. Roots are a decisive part of the soil-plant-atmosphere continuum. They are the site of resistance to water flow to the shoot and control the amount of water available to the plant. Within the root, two pathways have to be considered. The radial pathway defines the movement of water from the soil to the xylem vessels, and the axial pathway designs the movement of water from roots to the upper parts of the plants, using the xylem vessels. In the radial pathway, water has to move through a series of living tissues, each being a potential barrier to the flow. The

axial resistance is dependent on the maturity of the xylem vessels. Young loblolly pine (*Pinus taeda*) roots have three root anatomical zones white, condensed tannin and cork. Although mature xylem tracheids are present a few millimeters from the tip, they lack the ability to conduct water before the formation of the casparian bands in the endodermis. The unsuberized passage cells are abundant near the root tip. Due to the progressive deposition of the suberin lamellae, their number decreases rapidly in the white zone, and continues to decrease gradually in the condensed tannin zone. The cortical cells dies progressively through the condensed tannin zone. The endodermis remains alive until it is crushed by the formation of cork layer forming below it. The hydraulic conductivity, i.e. the capacity to transport water on an area (root) or length (axial) basis, was determined for the three anatomical zones of young loblolly pine grown on two different media (mist chamber and peat-vermiculite), as the soil influence the root geometry. Root ( $L_p$ ) and axial ( $Kh$ ) conductivity were measured by inducing absorption of water into the roots when connected to a vacuum pump. Root hydraulic conductivity in different media and root zones (white to cork) ranged from  $2.20E-6$  to  $1.5E-5$  m s<sup>-1</sup> MPa<sup>-1</sup>. Axial conductivity was  $4.2E-12$  to  $4.73E-10$  m<sup>4</sup> s<sup>-1</sup> MPa<sup>-1</sup>.  $L_p$  decreased by 75 to 85% from white to cork while  $Kh$  increased by 150 to 900%. Radial hydraulic conductivity ( $L_r$ ) calculated according to Landsberg and Fowkes (1978) was greater than  $L_p$  indicating that  $Kh$  could be limiting to  $L_p$ . The results of this study show the close relation between structure and function of the pine root, as it develops. Developmental changes in anatomy of the root coincided with predictable changes in hydraulic properties.

## **Comparison of Invertebrate Community Structure in Ephemeral Ponds Among the Terrestrial Ecoregions of Oklahoma**

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Although ephemeral ponds are ubiquitous and provide habitats for many invertebrates with a variety of life history characteristics, our knowledge of faunal community structure is weak. Patterns of species diversity can be attributed to the surrounding environment, prevailing soil type in which the habitat resides, biotic interactions (predation, competition) and chance events (whether a propagule has reached the habitat). Many species exist as metapopulations in fragmented landscapes, but persist regionally by dispersal to nearby habitats. The use of naturally occurring patchy habitats as a model of fragmentation in a human dominated landscape can aid the understanding of how environmental degradation impacts the metapopulation dynamics. Temporary isolated wetlands by definition are broadly distributed and occur in nearly all terrestrial habitats. In ephemeral wetlands an ecoregional foundation aids in determining quantitative biological and regional chemical criteria which is critical to protecting aquatic ecosystems. We tested the hypothesis that established terrestrial ecoregions are adequate predictors of ephemeral pond community structure. We sampled 140 temporary ponds over a three-month period from the 11 terrestrial ecoregions of Oklahoma for microcrustaceans. Water samples were taken and analyzed for specific conductivity, pH and temperature. Crustacean samples were taken using a dip net consisting of a 153  $\mu$ m mesh. Presently, 43 species have been identified in 15 habitats and continued classification and data analyses efforts are in progress.

## **Effect of Carvacrol and other Plant Oil Extracts on Autofluorescence and Membrane Potential of Escherichia coli**

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Carvacrol and similar plant oils are flavor components of many consumer products. Carvacrol has been shown to affect the survival and physiological properties of *B. cereus*. We investigated the effect of Carvacrol on *E. coli* using direct and indirect measures of toxicity. *E. coli* (strain C600 ATCC 47024) was incubated at 37 degrees C for 24 hours, then rinsed twice in saline, and treated with various carvacrol concentrations. The effect of carvacrol on *E. coli* was assessed in several ways: Survival after exposure of *E. coli* to bacteria was assessed by colony counts. We measured membrane potential through electrochromic fluorescent dye and the effect on ATP pools through Luciferase fluorescence. We then used autofluorescence, spontaneous fluorescence of *E. coli*, to assess the sub-lethal effects of carvacrol. Our results show that the threshold for significant carvacrol effects on *E. coli* are between 1 and 2 mM as determined by colony counts, membrane potential, and ATP pool measurement. The autofluorescence data showed significant changes at much lower concentrations of carvacrol suggesting that the autofluorescence detects physiological responses to carvacrol. These physiological responses may be key to understanding the mechanism of carvacrol inhibition of *E. coli*.

## **A Hydroponic Culture Method For *Polymyxa graminis* Using *Hordeum vulgare***

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*Polymyxa graminis* Ledingham, is an obligate parasite of many cereal grains including wheat and barley. *P. graminis* is the Plasmodiophorid vector of several soilborne viruses causing severe economic impact upon agriculture dependent upon grain production. Studies of *Soilborne wheat mosaic virus* (SBWMV) and *Wheat spindle streak mosaic virus* (WSSMV) transmitted by this vector are dependent on mechanical inoculation methods or natural transmission through the soil or infected plant material. The purpose of this study is to establish a *P. graminis* culture using hydroponically grown barley roots. Such a culture will enable virus transmission experiments to be conducted independently of a field source for both the viruses and the vector. Adams et al. (1986) has propagated both *P. graminis*, and the virus of interest *Barley yellow mosaic virus* (BaYMV), successfully in barley roots using an ebb and flow hydroponic system. Our previous experiments using hydroponically grown wheat were unsuccessful in propagating *P. graminis*. In this study, eleven barley cultivars have been grown hydroponically for 4-6 weeks in a modified Letcombe Laboratory nutrient solution, the roots harvested and examined for *P. graminis* resting spores microscopically. After three experiments, nine barley cultivars have proved to be successful hosts for *P. graminis* producing one to many resting spores.

## Implementation of GIS for Selecting Least Cost Pipeline Routing with Consideration of Economic and Ecological Factors

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For satisfying the growing energy demand of the modern society petroleum companies looking for new technologies that could allow them to manage their investment projects more effectively. Among the most challenging problems for the oil and gas industry is modeling of pipeline construction. Nowadays one of the most promising technologies that can take into account a lot of factors and lead to optimal solution for pipeline projects is Geographic Information System. Generally for optimization of pipeline route three major groups of factors are taken into consideration:

- engineering or technical characteristics of the projects;
- ecological or environmental characteristics and constrains;
- economic cost and effective of investments.

The problem is that usually a particular study concentrated only on one of the mentioned group of factors or at least try to combine two of them. Very few studies trying to take into consideration all three groups of factors and offer a methodology that allows to choose project which effectively combine engineering simplicity, minimum construction cost and environmental security.

This research tries to analyze engineering, environmental and economic factors of pipeline construction and to propose methodology for choosing the optimal pipeline routing not only from engineering and economic point of view, but also taking into consideration environmental factors.

Proposed methodology calculates ecological risk with respect to risk factors presence (wetland, rivers, industrial areas) and population affected in case of accident. Then combine economic and ecological costs by calculating relative ecological risk ratio (r-ratio) and cumulative economic and ecological cost by simple multiplication of economic cost and r-ratio. Finally, it allows to calculate least economic and ecological cost pathway with respect not only to economic cost, but also to ecological risk. For analysis simple function of raster GIS analysis can be used.

Presented methodology can be used for modeling of pipeline construction in any particular area without restriction, model is flexible – additional ecological risk factors or economic cost factors can be added in the analysis in case of necessity.

## Pre-and Post-package Surface Pasteurization of Deli Meats for Reduction of *Listeria Monocytogenes*

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Numerous outbreaks of foodborne illness and product recalls have been associated with ready-to-eat (RTE) meat products due to post-process contamination with *Listeria monocytogenes*. We have optimized several surface heat treatments to address potential post-process contamination. Post-package pasteurization has shown to provide a 2-4 log<sub>10</sub> reduction of *L. monocytogenes* on roast beef, turkey, and hams with 2-4 min heating at 200°F (Muriana et al., 2002). In this study we have examined pre-package surface pasteurization using a radiant heat grill, individually and in combination with submerged water post-package

pasteurization. RTE deli meat products were either dip-inoculated or contact-inoculated with a 4-strain “cocktail” of *Listeria monocytogenes* before heat processing treatments. Using radiant heat surface pasteurization (i.e., pre-package pasteurization), we have been able to achieve a 1-3.5 log<sub>10</sub> reduction with a 1-2 min process at 500-750°F, depending on the method of inoculation. When combined with post-package pasteurization, a minimum process of 1.0 min in the radiant oven followed by 1 min of post-package pasteurization, can provide >3 log<sub>10</sub> reduction of *L.monocytogenes*. This work provides microbial validation of pre-package pasteurization as a means of reducing potential surface contamination on RTE deli products by providing additional ‘hurdles’ into existing processes and is currently being adopted by various meat processing companies.

## **Boone & Crockett and Pope & Young White-tailed Deer: 1991-2000**

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This poster displays research examining the spatial distribution of Boone & Crockett (B&C) and Pope & Young (P&Y) record book white-tailed deer (*Odocoileus virginianus*) entries from 1991-2000. In total, 17,053 entries were mapped for this time period, including 2,576 B&C entries and 15,043 P&Y entries. Record book data was obtained from the B&C and P&Y clubs. All data was entered into a Geographic Information System (ArcView 3.2) and mapped at the region, state, and county level, providing a visual image of areas producing record book white-tailed deer. The B&C and P&Y entries were mapped separately on dot density maps to show differences in the distribution patterns between the two record books. The record books were combined on the main choropleth map to show a complete distribution of all record book entries. The maps generated in ArcView 3.2 were then imported into CorelDRAW where the graphic design and layout was completed. In total, 1,897 counties, or 60% of the counties in the United States, recorded at least one entry. The largest concentration of entries occurred in the upper Midwest, although significant clustering of entries occurred in several outlying regions. Clustering of entries occur in relation to large metropolitan areas, major river systems, and in regions with lower deer densities. Included on the poster are pictures of the current world record typical and non-typical white-tailed deer for both the B&C and P&Y clubs. A table showing the top fifty counties in number of entries into the B&C and P&Y record book, as well as the two combined, is displayed. A table showing record book entries by state is also displayed, which includes data from forty-three states. This table includes record book data for B&C, P&Y, and the combined record book totals for each state.

## **Multi-Trait Characterization of Select Eastern Cottonwood Clones**

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**MULTI-TRAIT CHARACTERIZATION OF SELECT EASTERN COTTONWOOD CLONES** Eastern cottonwood (*Populus deltoides* Bartr.) is the fastest growing woody species in North America and is utilized in production of a wide range of products worldwide. There is limited information concerning traits related to productivity in the first few years of growth. In addition, knowledge on the relationship between performance and clonal characteristics such as leaf, branch, and stem morphology; photosynthetic

efficiency; water use efficiency; and phenology is needed. I examined these clonal characteristics of eastern cottonwood clones and compared them to known clonal productivity. Twelve eastern cottonwood clones were selected from the southern portion of the natural range based on 12 - 20 years of growth data in replicated field tests on optimal sites. Unrooted cuttings of the selected clones were taken from cutting beds located near Idabel, OK. Two diverse sites and conditions were utilized in this research: a field study near Idabel and a potted study in Stillwater. Results of clonal comparison for each trait measured will be reported along with comparison of traits to known performance.

## **Children's Distress After a Natural Disaster**

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Research has shown that the vast majority of children who survive a natural disaster will suffer some negative effects. Symptoms such as withdrawal, conduct disturbance, difficulty concentrating, sleep difficulties, and persistent thoughts of the disaster can lead to impairments in social relationships and academic functioning that can have serious long-term consequences. Very little long-term data exists in the disaster literature, but that which does exist indicates that a significant number of children experience long-term persistent distress. While longitudinal studies of posttraumatic distress typically report a decline in symptom levels over time, disasters that are seasonal in nature (e.g., tornados) may lead to a different symptom pattern. No available research has examined seasonal changes in posttraumatic distress symptom levels; however, this may have important implications for victims of seasonal natural disasters. The purpose of this study was to examine the level of posttraumatic distress experienced by children in tornado-affected areas and to examine possible seasonal influences on distress. School districts in the North Central Oklahoma area that suffered damage during the May 3, 1999 tornadoes were contacted to participate in the study. Fifty-two children in grades 3-6 and their parents agreed to participate. Participants were predominately Caucasian and from intact families at the lower to middle income level. Approximately 18 months after the tornadoes of May 3, 1999, packets containing parent questionnaires and consent forms for child participation were sent home with children in grades 3-6. Two weeks later, the experimenters administered a series of self-report questionnaires to child participants during school hours. All self-report measures were read to the children. Parents completed a demographic questionnaire and the Tornado Exposure Questionnaire-Parent Report, a brief self-report measure designed to assess the family's degree of exposure to the tornado, including proximity, subjective evaluations, and degree of damage and disruption experienced. Children completed the Tornado Exposure Questionnaire-Child Report and the Frederick Reaction Index (RI), a 20-item self-report measure that assessed the presence and severity of PTSD symptoms. Significant elevations were found in children's posttraumatic distress levels as long as 2 years after tornadoes devastated Central Oklahoma. At both 18 and 24 months, over half the children in the sample were in the moderate to very severe range of posttraumatic distress as measured by the RI. Children's self-reports of fear during the tornado and of tornado exposure were significantly related to their distress, whereas parent reports of child fear during and after the tornadoes and of tornado exposure were not. The difference between parent and child reports in relation to child distress may have been a function of perceived versus actual threat. The stability of scores over the assessment interval suggested that children maintained their level of distress, perhaps because they were aware of the potential danger of a tornado recurrence. The best predictor of posttraumatic distress at follow-up was the degree of posttraumatic distress at the first assessment. Results indicated that children might experience more ill effects resulting from disasters than parents recognize, and that these effects may not remit over time.

## **Fused-ring Nitrogen and Sulfur Heterocycles by a Tandem SN<sub>2</sub>-Michael Addition Reaction**

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A tandem SN<sub>2</sub>-Michael addition sequence has been developed for the synthesis of cis and trans fused-ring nitrogen and sulfur heterocycles from ethyl ( $\pm$ )-(2E)-3-[2-(iodomethyl)cyclohexyl]-2-propenoates. Octahydro-1H-isoindole-1-acetic acid derivatives have been prepared in one step by reaction of the iodoester with (phenylmethyl)amine in ethanol in the presence of triethylamine. Octahydrobenzo[c]thiophene-1-acetic acids have been prepared by a two step sequence involving reaction of the iodoester with thiourea to afford the isothiuronium iodide adduct, followed by basic hydrolysis. Cyclization substrates are readily available in 25-30% yields using available synthetic procedures. Both processes afford cyclic products in good yields of 70-80%. The stereochemistry of the products has been elucidated using NOESY and X-ray crystallography.

## **Cloning of the SIP3 homolog in *Aspergillus nidulans***

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In *Saccharomyces cerevisiae*, the Snf1 (sucrose non-fermenting) protein kinase is required for transcription of glucose-repressed genes when glucose is limiting. The Sip3 protein belongs to the Snf1 kinase family and was found to interact "in vitro" with Snf1. The aim of this research is to isolate the sip3 homolog in *A. nidulans* and to determine whether sip3 is involved in its carbon catabolite repression. We have isolated cosmids that hybridize to a sip3 probe, and the entire genomic region has been subcloned and sequenced. The sip3 probe used is a clone that contains a fragment of the sip3 homolog in *A. nidulans* rescued in a different study. A disruption cassette has been constructed with the selectable marker argB. A sip3 disruption mutant will be created by transformation-mediated gene disruption using this cassette and its growth in various carbon-sources like glucose, sucrose and pectin studied and compared to wild type.

## **A Motion-Oriented Object Segmentation Algorithm for MPEG-4 Video Coding**

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The content-based function is a key feature in the MPEG-4 coding standard where object segmentation plays an important role. In this paper, a new automatic motion-oriented object segmentation algorithm is proposed to separate moving objects and still regions in a video scene. Particularly, we adopt a group of frames as the reference to obtain more accurate and complete moving detection, and we also improve the morphological motion connected operator by progressively accumulating the processed frames to reduce the computational complexity. The proposed algorithm involves five steps as follows: (1) the global motion estimation and compensation are conducted to reduce the mismatch between frames; (2) motion regions in a frame are filtered by using an improved morphological motion connected operator; (3) motion regions are detected

from the difference between the filtered frame and the original one; (4) motion regions can be completed by using a group of frames as the reference, and are merged into one binary mask; (5) motion analysis and morphological filter are used to refine the mask and to extract moving objects. The simulation results on the standard testing video sequences show that the proposed algorithm can accurately and efficiently extract both a single moving object and multiple moving objects.

Keyword: MPEG-4, content-based video coding, motion-oriented object segmentation, Morphological motion connected operators

## **Regulation of Arachidonic Acid Release in the Salivary Glands of the Lone Star Tick, *Amblyomma americanum* (L.)**

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During tick feeding, the salivary glands of Ixodid ticks counter the host's defense system by secreting a cocktail of bioactive molecules. An important component of saliva is prostaglandins (PGs). In order for PGs to be synthesized, the salivary glands must regulate release of their precursor, arachidonic acid (AA). Previous work has shown that dopamine (DA) initiates an influx of  $Ca^{2+}$  into the glands, activating an intracellular phospholipase-A2 (PLA2), leading to the release of AA. AA is then converted to PGs via the cyclooxygenase pathway. The use of either a D1 or D2-receptor agonist can also increase the release of free AA. Verapamil (voltage-dependent  $Ca^{2+}$  blocker) is able to block this effect. Experiments suggest cAMP stimulates a re-esterification of AA into salivary gland phospholipids (PL). GTP $\gamma$ S also stimulates an apparent release of AA and enhances DA or DA-agonist stimulated release of AA. Currently in the literature, work has been presented suggesting that heterotrimeric G-protein is involved in signal transduction. When the G-protein is cleaved during GTP activation, the  $\beta$ -subunit becomes involved in AC activation and the role of the  $\alpha$ -subunit at this point is not thoroughly understood. Work done by Viard et al. (1999) suggests that the dimer may be involved in  $Ca^{2+}$  movement into the cell. This potential movement was blocked with a fungal metabolite, wortmannin. The use of wortmannin was carried out with the lone star tick salivary gland and the fungal metabolite was a proven inhibitor of AA release from gland PLs. We hypothesize after salivary gland stimulation of a DA/G-protein linked receptor; a  $G_{\beta\gamma}$  subunit opens a voltage-dependent  $Ca^{2+}$  channel. This allows the increase of cytoplasmic  $Ca^{2+}$ , which activates PLA2 and releases AA from salivary gland PLs which are converted to PGs via the cyclooxygenase pathway.

## **Predicting Faculty Attitudes Toward Adoption of Computer-Based Instruction at Oklahoma State University**

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This study examines the effects of faculty attitudinal factors pertaining to the adoption of computer-based instruction. The findings indicate that faculty computer efficacy and gender are significant predictors of faculty attitudes toward adoption of computer-based instruction. In addition, the interaction between efficacy and gender is significant to account for variance in the criterion variable. However, female faculty have a

better attitude than male faculty on the continuum of computer efficacy in predicting faculty attitudes toward adoption of computer-based instruction.

## **The World Has Changed...How Do We?**

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It seems that the only unquestionable certainty is that tomorrow is certain to be different from today, and most likely will be more challenging as well. The events of September 11, 2001 have been threatening to crumble the foundations of the hospitality industry since that chilling morning; meanwhile, no one seems to agree on what will happen next. We look to our leaders for magical remedies, but they simply just do not exist. Security has been ripped away from the citizens of the world. No one wants to travel, go to dinner, or enjoy leisure activities at times like these. The public wants to stay at home with friends and family and hold on to what little comfort they have left. The hospitality industry is in a period of revolutionary change. As a result, jobs will become more dynamic and competition will be fierce. Employment positions that become available will be coveted, with the prize going to the noblest competitor. Tomorrow's leaders will excel in a radical new marketplace with confidence, speed, and adaptability by wielding an arsenal of skills that includes networking, progressive learning, flexibility, and focus. The research conducted by the students of HRAD 5850 was composed entirely of personal interviews conducted from September to December of 2001. The subjects were from varied specialties, yet all had the commonality of being a leader in the hospitality industry. While a wide range of topics were discussed; most prevalent were discussions that centered on the affects of the events of September 11th, and how graduates of collegiate hotel and restaurant programs could increase their marketability in a dynamic and fiercely competitive marketplace.

By condensing the ideas and opinions of the industry leaders, the students were able to extrapolate a set of six critical skills and/or habits for excelling in today's world.1.Network continually establish a base of contacts that can be called upon to provide essential services.

2.Never stop learning; CEOs of Fortune 500 companies read an average of 3-4 books per week; the average American reads an average of 1-2 books a year.3.Set SMART goals; goals that are specific, measurable, achievable, realistic, and timely.4.Turn the Interview around on the Interviewer; graduates are a commodity that can provide a service; see the interview as an opportunity to tell the employer what you can do for him.5.Who Moved By Cheese?; never get too comfortable with situations, and continually anticipate change.6.3 F's of Success; be fast, focused, and flexible Learning to apply these skills to everyday life will allow the graduate to rise above the competition and enjoy a wealth of opportunity.

## **Viability of Flexural Toughness Test for Carbon Fiber Reinforced Concrete**

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Toughness index provides the measure of energy absorption capacity under various loading configurations. Carbon fiber reinforced concrete and plain concrete beams were tested under four-point loading system to evaluate and compare the flexural toughness indexes. Toughness indexes were calculated by using ASTM C

1018 procedure and were compared with the Japan Society of Civil Engineer's (JSCE) procedure. We also evaluate the cracking stress and maximum stress with the help of load deflection curve plotted in Excel. Variability in the results of the two methods is discussed.

## **Mechanism of Ferric and Ferrous Ion Acquisition in *Campylobacter jejuni***

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Mechanism of ferric and ferrous ion acquisition in *Campylobacter jejuni*. *C. jejuni* is the most commonly reported bacterial cause of food borne infection in the United States. Although the genome sequence of *C. jejuni* NCTC 11168 has provided many insights into the physiology of *C. jejuni*, the molecular basis for the mechanism of *C. jejuni* infection is still poorly understood. Availability of iron in the host is a key environmental factor for controlling the establishment of many bacterial infections. We hypothesize that ferric and ferrous ion transport system exists in *C. jejuni* and that the ferric ion acquisition is controlled by *tonB* gene, while the ferrous ion uptake is *feoB* dependent. The global aim of our study is to determine the molecular mechanism of iron acquisition in *C. jejuni* through the *tonB* complex and *feoB* gene. The *tonB* plays the role of an energy-transducing complex, coupling the electrochemical proton gradient of inner membrane to active import process across the outer membrane. There are three putative *tonB* genes *tonB1*, *tonB2* and *tonB3* in *C. jejuni*. Although the three *tonB* genes are of similar size, they are sufficiently different in their genetic organization and amino acid sequence. This suggests that there might be unique functions performed by each of these *tonB* genes. The present study was aimed at disrupting the three *tonB* genes by directed mutagenesis approach. Each of the three *tonB* genes was PCR amplified from *C. jejuni* chromosomal DNA and cloned into restricted pUC19 plasmid that acts as a suicide vector in *C. jejuni*. Oligonucleotides were designed in order to generate a deletion within the cloned gene by inverse PCR. The primers were oriented in opposite direction enabling 5' and 3' end of the cloned gene as well as the cloning vector to be amplified. Kanamycin resistance cassette was inserted within the cloned gene and this construction was used to generate gene disruption in *C. jejuni* via homologous allelic exchange. Mutants were selected for resistance to Kanamycin when grown on Mueller-Hinton plates containing 30 µg/ml of Kanamycin. The double recombination events were confirmed by PCR amplification and Southern blot. The *feoB* gene in *C. jejuni* is a probable ferrous ion transport gene and is a homologue to the *feoB* gene in *H. pylori* and in *E. coli*. A functional high affinity ferrous ion uptake system encoded by *feoB* is known to be essential for *H. pylori* pathogenesis. The *feoB* gene in *C. jejuni* was knocked out similarly to the *tonB* gene mutants. Further work is being carried out to decipher the roles of *tonB* and *feoB* genes in iron transport under different iron limiting conditions and with different iron sources. The in-vitro studies to determine how the knockout mutations affect adherence and invasion of the human embryonic INT 407 intestinal cells are being currently performed. These studies will lead to a better understanding of the role of iron acquisition in the development of the pathogenesis of the disease. Thus, iron uptake could be a key target for the design of novel chemotherapeutic agents in future.

## **A Technique to Examine the Properties of Biomolecules: Ab Initio Calculations**

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Ab initio calculations are based on quantum mechanics. Thanks to computer technology development, it is now feasible to perform numerical ab initio calculations on small molecules with 20-30 atoms and more than one hundred of electrons using three 1GHz personal computers. We test four methods; HF/STO-3G, HF/3-21G, HF/6-31G(d) and B3LYP/6-31G(d) to optimize the structure and calculate the vibrational frequencies of trans-p-coumaric acid methyl ester (pCA-ME) in solvent. The computed frequencies with B3LYP/6-31G(d) method give strikingly excellent agreement to experimental data while frequencies obtained from other three methods give less to good agreement to the experimental data. Applying this B3LYP/6-31G(d) method, we investigated the solvent effects on the carboxylic acid group of Glu sidechain and found the importance of solvent environment to functional behaviors of polar residues in proteins. Here we will report the above four ab initio methods on structural optimization, calculations of charge distributions, electric fields, vibrational frequencies of pCA-ME, and frequencies; dependence of dielectric media. These applications indeed provide structural information of the biomolecules from another angle.

## **Age and Time Dependent Effects of Equitoxic Dosages of Parathion or Chlorpyrifos on High Affinity Choline Uptake in Rat Cortex and Striatum**

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High affinity choline uptake (HACU) in brain is altered in adult rats after exposure to some organophosphorus (OP) toxicants. Immature rats are more sensitive than adults to the toxicity of OP insecticides parathion and chlorpyrifos, but little is known regarding age-related effects on HACU. AChE and HACU in cortex and striatum of neonatal (7 days), juvenile (21 days) and adult (90 days) rats (n=8-15/treatment group) were evaluated at 4, 24 or 96 hr after equitoxic exposures to parathion (LD10 = 0.8, 1.5 and 6.6 mg/kg, po) or chlorpyrifos (LD10 = 15, 47 and 136 mg/kg, po). HACU was studied by incubation of synaptosomes with [<sup>3</sup>H]choline and subsequent separation of incorporated and unincorporated label by rapid filtration. Parathion elicited relatively similar levels of peak ChE inhibition in all age groups (64-82% at 4 hrs after dosing). Chlorpyrifos also elicited similar age-related reductions in ChE activity (81-91%), but peak inhibition was earlier in neonates and juveniles (4 hrs) than in adults (24 hrs). HACU was increased after parathion exposure, with maximal increases occurring at 4 hrs after exposure in neonatal striatum (52%), juvenile cortex (19%) and striatum (23%), and at 96 hrs after treatment in adult cortex (41%) and striatum (36%). In contrast, HACU was generally reduced by chlorpyrifos, with maximum reduction at 4 hrs after dosing in neonates (43%), 24 hrs in juveniles (22%) and 96 hrs in adults (18%). Interestingly, HACU was increased (15%) in neonatal striatum at 96 hrs after chlorpyrifos. Increased uptake of choline could lead to higher acetylcholine synthesis and amplification of the toxic consequences of parathion-induced acetylcholinesterase inhibition. Alternatively, a reduction in HACU following chlorpyrifos could potentially limit the amount of ACh released into the synapse and thereby reduce cholinergic toxicity. Changes in HACU may contribute to OP toxicant-selective and age-related toxicity following AChE inhibition by these two insecticides. (Supported by STAR grant GR825811 from U.S. EPA).

## **Comparison of Two Soil Salinity Extraction Methods**

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Saturated paste and 1:1 soil to water extracts are commonly used by laboratories in assessing soil salinity for field remediation. Correlation of electrical conductivity (EC) and other analytes between these methods is not well documented. This study was conducted to further examine these relationships using a wide variety of soils. Saturated paste (SP) and 1:1 soil to water extracts (1:1) were prepared from soil samples received by the Soil, Water and Forage Analytical Laboratory at Oklahoma State university and analyzed for electrical conductivity (EC), major cations (Na<sup>+</sup>, K<sup>+</sup>, Mg<sup>2+</sup>, Ca<sup>2+</sup>) and major anions (Cl<sup>-</sup>, NO<sub>3</sub><sup>-</sup>, SO<sub>4</sub><sup>2-</sup>). Relationships of all analytes for both methods were established using linear regression. In general, analytes from 1:1 soil to water extracts and saturated paste extracts were highly correlated, but were affected by soil texture (fine and coarse textural groups) and ionic charge (mono-valent vs. divalent). Findings from this study can be useful in minimizing analysis cost and time by allowing accurate conversion of 1:1 analysis to saturated paste result basis.

## **Developing a Spatial Database for Shoreline Management at Keystone Lake, Oklahoma**

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This project aims at developing a spatial database for Keystone Lake in Oklahoma using ArcView, a desk top Geographic Information System (GIS). The spatial database will assist the lake's, management team in techniques to abide by the Shoreline Management Act of 1971. The Act is a Federal enacted plan to manage and protect the U.S. waterway's shorelines, through regulating development in the shoreline areas. The Act's scope is to enhance long-term conservation of living and non-living resources while improving aesthetic appeal to publicly accessible water resources by managing human use of the shoreline and adjacent lands. By studying land use patterns in relation to shoreline processes, the environmental impacts can be assessed with regards to residential and commercial actions. One guideline of the Act deals with the construction and human activities along shoreline areas. This is accomplished by setting cove density, standards of dock construction, and the clearing of vegetation by mowing, tree trimming, or clearing of underbrush. An application such as this falls within the scope of GIS capabilities.

The elements of GIS, such as data acquisition and preprocessing, data storage and management, and data manipulation and analysis will function as a planning and management tool to implement Shoreline Management. GIS's visual features including thematic maps, charts, and table will further assist the management team. Lastly, GIS technology can be tailored to the specific geographic, economic and environmental needs set by the community. The poster gives general design of this type of research.

## **Development of a Robust Strategy for the Construction and Utilization of DNA Microarrays for the Cyanobacterium *Synechocystis* sp. PCC 6803**

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DNA microarrays were developed to monitor global patterns of differential transcription in *Synechocystis* sp. PCC6803, a transformable cyanobacterium widely utilized to study photosynthesis and gene regulation. Our strategy minimizes the cost and effort to replicate the PCR-generated DNA gene fragment library and facilitates several downstream processes beyond the primary objective of producing DNA microarrays. Bipartite primers containing both gene-specific and engineered sequences (adaptamers) allowed a two-stage amplification of the 3168 genes identified on the genome. The gene-specific sequences were of variable length to maintain uniform annealing temperatures during the 1st round PCR synthesis, and situated to preserve full-length ORFs. Longer genes were truncated at 2 kb to permit efficient amplification, yet, over 80% of the PCR gene set fragments are full-length genes. The adaptamer sequences allow 1.) the 2nd round synthesis to be performed using universal primers, 2.) directional cloning of fragments with a Type II restriction endonuclease, and 3.) high-throughput gene expression as affinity-tagged (e.g. His6) fusion proteins due to the removal of the native stop codons. We optimized enzyme and amplification conditions resulting in 86% success in the initial round of PCR amplification with the remaining 14% of genes successfully amplified using redesigned primers. A semi-automated gel analysis procedure scored products on the basis of size and absence of multiplicity. In-house software was developed to organize the project and track samples from primers to PCR products to microarray locations. The two-stage amplification had the unanticipated advantage of normalizing the yield of PCR products across the gene set such that lower than average yielding products from the 1st round PCR (using the gene specific sequence and chromosomal DNA as template) often had a robust yield during the 2nd round of amplification using the common universal sequences. The efficiency and inter-lab transportability of this strategy was demonstrated by the virtual error-free amplification of the entire genome complement of 3168 genes in the partner lab by a replicate 2nd round of PCR amplification using universal primers and 1st round PCR products that were sent as template. This sets a model of how the DNA fragment library can be propagated replicatively through the cyanobacterial community. The gene fragment library was arrayed onto surface-modified glass slides and hybridization procedures, involving chemical coupling of Cy-dyes into allyl-conjugated cDNA of total RNA, were developed based upon our earlier experience with sub-genomic (500 gene) arrays. In addition to describing the method for production of these arrays, experiments monitoring changes in global transcriptional profiles in response to salt stress will be presented.

## **Seasonal Occurrence and Control of Ectoparasites on the Fox Squirrel, *Sciurus niger* (Rodentia: Sciuridae)**

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The fox squirrel (*Sciurus niger* L.) is a rodent of medium size expressing no sexual dimorphism. Because of its broad and diverse habitat, the fox squirrel is a likely means of transfer of potential arthropod-borne disease vectors. It is thus useful to gain knowledge of what types of ectoparasites occur on the fox squirrel throughout the year. Additionally, the ability to control ectoparasites on fox squirrels could prevent the transfer of disease pathogens.

The first part of this study was a survey of ectoparasites on fox squirrels, which were live-trapped or harvested by firearm. Ectoparasites collected from fox squirrels included all life stages of *Dermacentor variabilis* (Say) (Acari), larval and nymphal *Amblyomma americanum* (L.) (Acari), nymphal *Ixodes scapularis* Say (Acari), larval *Haemaphysalis leporispalustris* (Packard) (Acari), adult *Orchopeas howardii* (Baker) (Siphonaptera) and *Nosopsyllus fasciatus* (Bosc) (Siphonaptera), immature and adult *Neohaematopinus sciurinus* Mjöberg (Anoplura) and *Hoplopleura sciuricola* Ferris (Anoplura). Ticks and fleas were found throughout the year, while the louse populations peaked during the winter months and were reduced during warm months.

The second part of this study focused on tick control involving treatment with fipronil. Eight squirrels were removed from our laboratory colony, sedated, fitted with nylon sleeves and infested with 50 nymphal *D.variabilis*. On day three, four of the squirrels were treated with 3cc of fipronil diluted in refined oil and four with simply 3cc of refined oil. The infestations were repeated 30 days after treatment. In both trials, ticks feeding on untreated squirrels attached readily and fed to engorgement. Ticks feeding on treated animals detached at the time of fipronil treatment or became replete without engorgement. Percent engorgement and tick weight after feeding were significantly greater for ticks feeding on untreated animals than those feeding on treated animals ( $p < 0.05$ ).

## **A Preliminary Investigation of the Relationship Between Potential Teachers' Science Teaching Self-Efficacy and Higher Level Questions**

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This study investigated the relationship between potential teachers' science teaching self-efficacy and higher level questioning. The sample consisted of 18 potential teachers who participated in a Summer Science Academy in Oklahoma. Multiple regression analysis was used to determine whether the two components of potential teachers' science teaching efficacy beliefs are predictors of higher level questions and the significance of those predictors. The two components are Personal Science Teaching Efficacy (PSTE) and Science Teaching Outcome Expectancy (STOE). Results suggest that science teaching self efficacy accounts for about 31% of the variability in higher level questions and PSTE may be a better predictor than STOE. With this in mind, teacher education programs could enhance preservice teachers' PSTE by providing experiences that include peer teaching and increased field experience.

## **Constraints that Reduce Help-Seeking from Married Couples Considering Divorce: An Oklahoma Perspective**

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Recent literature and events were reviewed regarding high divorce rates and subsequent marriage initiatives evolving at the state level across the U.S. A theoretical model is proposed to use in the identification of individual, relational, and environmental/societal level constraints that keep Oklahomans from seeking help. A data collection method was designed and used to identify constraint variables that were then used to build

the "Help-Seeking Scale," an instrument to measure these possible constraints. The instrument was tested using four levels of criteria including a pilot study. Reliability of subscales are reported and implications are discussed.

## **Reduction of Salmonella by Armour and Standard Brands Egg White Pasteurization Method**

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Pasteurization of liquid eggs was initially performed "off-line" at processing facilities with eggs that could be days, weeks, or even months old. Currently, many egg pasteurization facilities are "in-line" whereby eggs are brought by conveyor from production houses directly into processing facilities. The difference between the two processes is that the egg white of fresh eggs is approximately pH 8.2 whereas that of older eggs is likely to be approximately pH 9.0. Our objectives were to evaluate the effect of pH on two popular egg white pasteurization procedures, the Armour and Standard Brands methods using a 5-strain cocktail of *Salmonella*. We devised a bench-top pasteurization system that mimics these two processes, both of which require hydrogen peroxide to be metered into the egg white stream prior to entry into the main heating unit. Both processes were evaluated at 3 pH levels (pH 8.2, 8.6, 9.0), at 3 temperatures (125oF, 127.5oF, 130oF), and over 4 residence times to allow calculation of D-values at each temperature. When compared at the minimum allowable time and temperatures for each process (i.e., USDA Egg Pasteurization Manual), our results show a greater log reduction for the Standard Brands method than the Armour method at all pH levels tested. Almost all runs at any given temperature showed more reduction at pH 9.0 than at pH 8.2 except for the Standard Brands method at 130oF which showed the most consistent reduction levels at all 3 pH values. Linear regression ( $r^2$ ) values for decimal reduction curves were 0.96 or better. It is important to review food processes periodically as conditions change that may affect the overall process. We have demonstrated that there is less reduction of *Salmonella* with low pH egg white typical of modern in-line facilities than with high-pH egg white typical of off-line processing. The data obtained will be utilized to determine whether changes need to be made in an updated USDA-FSIS egg pasteurization manual.

## **Establishment and Impact of the Musk Thistle Head Weevil, *Rhinocyllus conicus*, and the Rosette Weevil, *Trichosirocalus horridus*, for Control of Musk Thistle, *Carduus nutans*, in Oklahoma**

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*Rhinocyllus conicus* Froelich, the musk thistle head weevil, was released in northeastern Oklahoma beginning in 1991 for biological control of *Carduus nutans* L., the musk thistle, with weevils released in 34 counties by 2001. *Trichosirocalus horridus* (Panzer), the rosette weevil, was released in six counties in 1998, and releases in 2000 and 2001 brought the total 29 counties. Release areas were surveyed in 2000 and 2001 to determine the level of weevil establishment. Head weevils were recovered from 30 of 34 counties. Thistle infestations were considered well infested if 30% of heads had 4 larvae/pupae present. Sixty-three percent of the counties had 25% of the sites well infested. Thistle density has been reduced in 13 weevil

release counties. Rosette weevils were recovered in three of the six original release counties, and one county with no releases up to that date. A combination of head and rosette weevils present in the rosette weevil recovery areas provided a synergistic reaction with thistle density reductions occurring faster than in head weevil alone sites. Head weevils have established in Oklahoma and are reducing thistle infestations. Rosette weevils are established in several of the 1998 release areas.

## **Expression Analysis of Salt Stress on *Aspergillus nidulans***

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The effects of high levels of exogenous sodium chloride on *Aspergillus nidulans* are described based upon microarray analysis using approximately 2,600 cross-linked targets from an expressed sequence tag (EST) collection. Experiments show transcript regulation of genes with homology to *Saccharomyces cerevisiae* genes shown previously to be affected. In addition, many EST sequences with unknown functions appear to be regulated under the osmotic stress making them targets for further study and elucidation of how a multi-cellular organism reacts to saline stress.

## **Differential Gene Expression in Wheat Roots in Response to Infection by the "Take-All" Fungus *Gaeumannomyces graminis* var. *tritici*.**

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Take-all [*Gaeumannomyces graminis* var. *tritici* (Ggt)] is regarded as the most damaging root disease affecting wheat worldwide. Control of take-all has been suggested to increase yield up to 10 to 50%. Procedures for studying the infection process under controlled conditions were developed. Seeds were sterilized with 1% AgNO<sub>3</sub> (30s), rinsed with sterile-deionized water, placed on sterile filter paper in a cold room (4.5°C) without light for 48 hours. Imbibed seeds were then aseptically transferred to 1/5X PDA medium at 25°C without light for 48 hours. Seedlings with roots approximately 2.0 to 3.0 cm long were transferred to fresh 1/5 strength PDA medium (control) or to a Ggt lawn (14 days) (treatment) and placed back into a 25°C incubator without light. A time course for infection was determined with light microscopy. Growth analysis of root length increase indicated that there was a 51.2%, 46.2%, and 78.8% decrease in growth at 12, 24, 48 hours respectively as compared to the controls. Results indicated that at 12 hours Ggt had colonized the root surface, at 24 hours root hairs were penetrated, and at 48 hours root hairs collapsed and the fungus had penetrated the epidermis and cortex. These times are currently being used to sample tissue and create normalized cDNA libraries by suppression-subtraction hybridization. Gene expression profiles obtained from this research will provide insight into the host-pathogen interaction with the hope of eventually developing resistance to this soilborne fungal pathogen.

## **The Effects of Agricultural Pesticides on Learning in the Honeybee (*Apis Mellifera* L.) With Special Reference to Chemicals Considered Not Harmful to Foraging Hymenoptera**

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Honeybees are valuable crop pollinators, and it is therefore imperative that pesticides used on bee-foraged crops do not produce harmful effects in these beneficial hymenopterans. Several classes of target-specific pesticides are labeled “not harmful” to foraging bees, including tebufenozide, diflubenzuron, propargite, sulfur, and dicofol. However, when dicofol was demonstrated in the laboratory to disrupt learning behaviors in honeybees, the validity of this label fell into question. In this study, two types of classical conditioning experiments tested the effects of diflubenzuron and tebufenozide on simple and complex learning in honeybees. Simple learning trials were based on the acquisition and extinction of a behavior while complex learning trials tested discrimination of two stimuli. Harnessed bees were fed crop-labeled concentrations of the pesticides, and any effect from that pesticide was measured through the frequency of proboscis extension responses. Results showed that simple learning declined with an increased concentration of pesticide, and complex learning either declined or maintained a very low constant. These results were consistent with both diflubenzuron and tebufenozide, though diflubenzuron produced a greater negative effect than the other chemical. The implications of these results suggest that these chemicals may “harm” bees by disrupting their ability to learn foraging behaviors.

## **Acute or Repeated Restraint Stress Do Not Increase Pyridostigmine Bromide Entrance into the Brain Through the Blood-Brain Barrier**

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Thousands of US soldiers complained a variety of symptoms including fatigue, headache, disturbance of sleeping, muscle and joint pain and etc since returning from Persian Gulf War (PGW). Increased pyridostigmine bromide (PB) neurotoxicity has been considered as a factor of the development of the unexplained illness. PB is a carbamate cholinesterase inhibitor with a quaternary ammonium thus would not expect to enter the central nervous system (CNS) through the blood-brain barrier (BBB) under normal condition. Due to its temporary cholinesterase inhibition, PB was used prophylactically to protect western soldiers from organophosphorus nerve agent exposure as during PGW. Recent studies however suggested that stress may alter the BBB integrity and allow PB to enter the brain. We evaluated the effects of acute or repeated restraint stress on the BBB permeability and PB neurotoxicity on acetylcholinesterase (AChE). For the acute physical restraint study, rats were 1) restrained for 90 min and then given maximum tolerated dosage (MTD) of PB (30mg/kg) for 1 hr, 2) restrained and given MTD of PB for 1 hr simultaneously and 3) were restrained for 3 hrs and then concurrently restrained and exposed to PB for 1 hr. Results suggest stress affected little on the signs of cholinergic toxicity and frontal cortex AChE activity. Activity of heart injected horseradish peroxidase (HRP) did not increase in the frontal cortex, cerebellum and hippocampus of the rats restrained for 1 hour, which suggests no change in the BBB permeability following restraint stress. For repeated restraint and PB interaction study, rats were concurrently restrained and treated with either saline or PB (3 or 10mg/kg) for one hour on daily basis for 14 days. Rats showed minimal SLUD signs and involuntary movement in response to PB exposure for the first 3 days and adapted to the PB exposure thereafter. However daily restraint did not alter the SLUD signs and involuntary movement. 50-80%

peripheral AChE inhibition was noted in the blood and diaphragm of the rats repeatedly treated with PB for 14 days. No significant change of AChE activity in the frontal cortex, cerebellum, hippocampus and hypothalamus were found following 14 days daily restraint and PB exposure. Our results suggest penetration of PB through BBB was not increased following either acute or repeated physical restraint stress.

## **Recruitment Strategies in the Just For You Study: Reducing Disease Risk Among Low-Income Postpartum Women**

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Recruitment and retention of subjects for longitudinal prevention trial is challenging. Little information is available on successful strategies for recruiting women from racial and ethnic minority and low SES groups into prevention studies. Additional strategies may increase recruitment of women from varying backgrounds like ethnicity, languages, and age in sufficient numbers into a dietary and activity modification trial study. Therefore, we evaluated factors associated with successful recruitment including characteristics of respondents and non-respondents, recruitment experiences and methods. All 7 data collectors completed a 13-question survey to evaluate recruitment. Recruitment tracking included reviewing weekly logs and participants' files. The 45 participants included in this analysis were between the ages 18 and 44, met WIC eligibility, had telephone access, had infant between 2-6 weeks old, and were not enrolled in an alcohol/substance program. Eligible participants are recruited in Boston and Western Massachusetts. All surveys were completed at the time of analyses. Age, language, BMI, and weight rank were evaluated as characteristics of participants and refusers. Weekly recruitment logs and participant files were used to track recruitment. Data from 7 data collectors and 45 participants and 31 refusers were used in these analyses. Survey results showed that the data collectors described the majority of participants and refusers as English-speaking, <30 years of age, mean BMI of 29 and weight rank of 5.6 on a scale of 1-9. WIC Nutritionist referrals were rated as the most important mode of recruitment and monetary compensation was rated as the primary reason why women participated. Findings suggest that by improving community outreach, using various forms of media, communicating with WIC staff, having a consistent data collector at each site, and emphasizing the "paid" portion of the study may help increase recruitment.

## **Exercise and Immune Response**

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The purpose of this study was to determine if the teaching loads of group fitness instructors affected their immune response, as reflected by the frequency of upper respiratory tract infections (URTI's). Two sub-problems were also under investigation: whether the ages of the instructors or the amount of sleep they averaged also affected immune response. Clinical and epidemiological data supports the idea of a "J-curve" model in exercise and immune response. The "J-curve" model hypothesizes that moderate exercise enhances the immune system, while heavy and chronic exercise may suppress it. This study was an attempt to test the "J-curve" theory with group fitness instructors. Written responses from a survey (n=332) divided the

instructors into three groups of light, moderate and heavy teaching schedules. The same survey assessed the symptoms of URTI's with a validated 13-symptom checklist that asked the instructors to recall cold symptoms over the past three months. One-way ANOVA's were used to compare the three groups, with all hypotheses tested at the 5% level. The results indicate that there was no statistical difference among the three groups.

## **Seventh Grade Students' and Teachers' Attitudes and Actions Relative to Parental Involvement**

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Research has emphasized the importance of parental involvement. Research indicates that students whose parents help with homework, attend school activities, promote good behavior and strong work ethic, show concern and give words of encouragement and praise have better attitudes toward learning. They also generally perform better academically and are less likely to drop out than those students whose parents are not as actively involved in their education. Teachers tend to agree that parental involvement contributes to student success, effective teaching and a positive school climate. However, research has shown that school efforts to involve parents decrease as children become adolescents and enter middle school. Therefore, the main purpose of this study was to explore 155 seventh grade students and 30 seventh grade teachers' attitudes and actions toward parental involvement in the learning process. Participants in the study were 155 students and 30 teachers in an Oklahoma middle school. Each student participant completed a parental involvement survey and each teacher participant completed a parental involvement survey that contained statements that were adapted from Berger (1991). The data were analyzed to determine both students' and teachers' attitudes and actions toward parent involvement.

## **Anatomical Changes in Loblolly Pine Roots and Quantification of Absorbing Surface Area**

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Roots have an important role in determining the amount of soil solution accessed by the plant. Primary roots of loblolly pine are characterized by having three distinct zones: "white zone", "condensed tannin (CT) zone", and "cork zone", with differences in the amount of absorbing surface area. Presence of the Casparian band and suberization of the endodermal cells act as an apoplastic barrier to the entry of water and nutrients into the stele. Unsuberized (passage) cells have a significant role in the absorption of soil solution in the CT zone. Mycorrhizae also contribute significantly in increasing the absorbing surface of the roots. Main objectives of this research were to determine the anatomical changes due to suberization of root endodermis in young loblolly pine seedlings, and to quantify cortical plasmalemma surface area (CPSA) in different root zones under varying environmental conditions. Roots collected from mist chamber, peat-vermiculite, and sandy loam were used to determine anatomical changes and conductivity of xylem. Cross sections from each 10 mm segment were stained with Fluorol Yellow 088 and observed under epifluorescent illumination. Although cortex and stele were evident from 10 mm from the tip, endodermal maturation was delayed in

mist chamber. Gradual death of cortex and decrease in the number of passage cells progressed in the CT zone. Significant differences were noticed in complete suberization among the three media. An average of 65 - 70 cells comprised the endodermis that was crushed by the origin of an internal cork layer. For determining the extent of xylem conductivity, tips of white roots were stained with Calcofluor M2R (Cellufluor) allowing the distal end to dry in humid air. This forced the dye to move into the conducting xylem. After staining the segments were crushed flat on slides and observed under epifluorescent illumination. Extreme tip of the root was hydraulically isolated while conducting xylem was noticed at 7 mm in mist chamber and 9 mm in both peat and sand. For quantifying CPSA of seedling roots during the first year of growth under nursery conditions, soil cores were excavated up to 50 cm deep using 4 inch diameter PVC pipes and cut into 10 cm lengths. Roots were washed and categorized into white, CT, and cork zones. Mycorrhizal tips were quantified and growth parameters of the shoot were measured. Roots were scanned using Delta-T scan software to determine diameter, length, surface area and volume. Representative samples were used to determine anatomical changes, extent of conducting xylem and quantify CPSA. Roots and shoots were dried and weighed to assess biomass production. Analysis of data to quantify root production parameters, such as root density, root growth rate, root production, specific root length, and root length density, is progressing. Preliminary results indicate a close relation between the structure and function of roots that are beneficial in defining better models of water uptake and in tree improvement programs.

## **Detection of Differential Gene Expression in Yew Cells in Response to Elicitation Using The cDNA-AFLP Approach**

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The production of taxol, a powerful anticancer agent, can be increased significantly by adding certain chemicals known as elicitors to suspension cell cultures of yew species. Due to the fact that taxol is synthesized through a complicated biosynthetic pathway, which is catalyzed by multiple enzymes, this elevated level of taxol biosynthesis is a reflection of the up-regulation of its biosynthetic enzymes. Variation in the gene expression level of those committed enzymes is assumed to be part of the reason for this regulation. In this report, we employed cDNA-based AFLP (Amplified Fragment Length Polymorphism) approach to determine the changes in gene expression patterns in the elicited cells. Our data showed this method is sensitive and reliable to detect gene expression alternations. When compared with the non-elicited cells, the differential expression patterns were observed in the elicited cells. Some differentially expressed genes were found to be related to taxol biosynthesis, while the identities of others need to be determined. The cDNA-AFLP approach used here, proved to be a very powerful tool to identify genes encoding those yet unknown enzymes involved in the pathway of taxol biosynthesis, improves our understanding of the elicitation mechanism on plant secondary metabolism.

## **Using Imagery as a Strategy to Enhance Reading Comprehension**

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One characteristic of good comprehension is the use of imagery. Imagery is experiencing something in the mind when there is no explicit corresponding stimulus. Imaging can be seen as a general mental process underlying visual, auditory, haptic, smell, taste, and integrated sensory experiences, e.g., movements, motions. Although imaging seems to be universal, the imaging process is likely to be as diverse as are the individuals who are imaging. Assuming that thinking is tied to imaging, Pavio (cited in Sadoski, 1985) purports that certain images can serve as storage, retrieval, and redintegration devices for related information. In other words, certain memories serve as mental "pegs" on which other recollections are "hung." When working with abstract information, these "pegs" serve a useful function because concreteness is the variable most related to the comprehensibility and recall of information. If abstract information can be hooked onto some form of concrete memory peg, the desired information can be easier to recall. Imaging is a "learning by doing" strategy, a strategy that invites readers to construct meaning by integrating background information with the text in a visual-sensory approach. Imagery is a tool that can help readers learn how to control and organize information. It improves understanding, helps in making inferences and predictions, assists with problem solving, and increases the reader's ability to remember. Some researchers (Gambrell & Bales, 1986) imply that imaging might be more effective than rereading, note taking, and underlining. Imagery allows an individual to expand his or her reading strategies.

## **Effects of Excess Sugar Intake on Parathion Toxicity**

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Excessive sugar intake could alter the pharmacologic and toxicologic properties of numerous xenobiotics. Previous study in our laboratory has shown that 15% glucose in drinking water increased the cholinergic toxicity of parathion (PS) and delayed the recovery of acetylcholinesterase (AChE) activity in adult rats. We hypothesized that the increased toxicity of PS is through the impairment of de novo synthesis of new AChE molecules. In the present study, effects of 15% High Fructose Corn Syrup (HFCS) in drinking water on the toxicity of PS were investigated in both the juvenile and adult rats. Rats were given tap water or water containing 15% HFCS for a total of 10 days. After the first three days, animals were treated with PS (18 mg/kg for adults and 6 mg/kg for juveniles, sc). Body weight, intakes of food, water and sugar, and signs of cholinergic toxicity were recorded daily. Subsets of animals were sacrificed at 2, 4, 7 days after PS treatment, and AChE activity and AChE immunoreactivity (AChE-IR) in both frontal cortex and diaphragm were measured. HFCS drinking were associated with a significant reduction in food intake in both juvenile (25~35%) and adult (35~40%) rats. Cholinergic toxicity and body weight reduction following PS exposure were increased by HFCS in both age groups. Inhibition of AChE activity was increased (15~20%) in both cortex and diaphragm from adult rats but no significant effect was noted in juvenile tissues. AChE-IR in cortex was not affected under any conditions. Diaphragm AChE-IR in adults, however, was reduced significantly by both PS and HFCS, and greatest reduction was noted in rats drinking sugar and treated with PS. In juvenile rats, diaphragm AChE-IR was reduced only in rats drinking HFCS and treated with PS. The results suggested that excessive sugar intake may decrease de novo synthesis of new AChE molecules in some tissues, limiting recovery and exacerbating the toxicity of PS exposure.

## **Using Field-Based Spectroscopy/Radiometry to Detect Greenbug Infestation on Wheat**

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A critical component of integrated pest management (IPM) involves a method for monitoring fields to determine whether there is a pest problem. Remote sensing techniques can identify pest infestations in agricultural fields. Field-based remote sensing techniques could provide a vital tool to study such stress in crop plants. The main aim of our research is to determine the onset of change in the spectral characteristics in wheat canopy when subjected to stress due to greenbug, an economically important insect pest of wheat in the Great Plains. Considering advantages of field-based spectroscopy/radiometry, such as higher spatial resolution and convenient monitoring, a hand-held Exotech radiometer is used to measure canopy reflectance from wheat crop. Our preliminary greenhouse experiments using flat-grown wheat involved three treatments: infested with greenbug and without insecticide treatment, non-infested and insecticide treatment, non-infested and without insecticide treatment. Canopy reflectance was monitored three times per day for 18 days. Data analysis shows that there is a significant difference of NDVI between infested wheat plants and non-infested wheat plants. Furthermore, the significant change in NDVI is evident after 10 days of infestation. Based on the preliminary results, it can be concluded that it is possible to detect greenbug infestation on wheat by using field radiometers or spectroradiometers.

## **The Impact of Stable vs. Unstable Relationships on Teenage Mothers' GPA, Attendance, and Test Scores**

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Statistics indicate that four out of every ten teenage girls become pregnant every year. This translates to about a million teenage mothers. Prior research on adolescent childbearing has focused almost exclusively on socioeconomic outcomes, not taking into account the psychological and social changes that occur in the lives of these young women. Adolescent mothers are more likely than non-teenage mothers to experience depression, anxiety, a sense of futility, and that they are living a day-to day existence that isn't going anywhere. The present research examined the impact that a relationship with a "significant" other can have on a teen mother's ability to cope with the demands of motherhood while trying to further her education. The term significant other refers to a romantic or love interest in her life rather than the relationship she has with family or friends. The major hypothesis in this study was that a positive significant relationship is able to counteract a lot of the negative affect of being a ten mother. Such a relationship provides a buffer against financial hardships, dependence on public assistance, lack of a social life, unexpected responsibilities, and difficulties encountered in forming new relationships, Teen mothers in stable positive relationships have been shown to have higher GPA's, better class attendance, and higher test scores. The present study interviewed forty teenage mothers attending Emerson Secondary School in Oklahoma City, OK. A fifty-three item Questionnaire was used which incorporated the Rosenthal Self Esteem Scale and Beck's Depression Inventory.

## **Workplace Violence and Non-Employees: Is There Cause for Concern?**

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During the four-year period of 1992 through 1996, more than two million people were victims of workplace violence. This is a significant number considering that one-sixth of all violent crimes in the United States occur in the workplace. The present study examined the extent to which employers and employees in sales, government, and law enforcement were knowledgeable about the potential threat of workplace violence and were aware of their company's policy regarding workplace violence. A questionnaire was developed which consisted of twenty-four questions. Results of the study suggest that while organizations have workplace violence policies in place, few would be effective in the event of a violent situation. It seems that additional training is necessary to educate all personnel to the potential for workplace violence.

## **Isolating the Protein in the Retina Responsible for Sight**

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In this experiment, we create a vector that was used to genetically engineer mice to study the function of genes in photoreceptor cells. A technique termed gene deletion or knockout in mice aids researchers in studying gene function. Elementarily speaking, we delete the gene, grow the mice, and observe the effects to the mice. However, deletion of some genes, such as PLCal, is embryonic lethal; the mice die during the embryonic development stage where photoreceptor cells have yet to be fully developed. To avoid this problem, we must delete genes only in a particular tissue. Since we are interested in gene function in photoreceptor cells, we decided to use the Cre-recombinase to establish a cell-type specific knockout system for photoreceptor cells. Specifically, construct recombinant plasmid DNA carrying restriction sites in front of and at the end of the Cre-recombinase gene. This will allow us to introduce a cell-type specific promoter for driving the expression of the Cre gene and remove the bacterial portion of the plasmid for making transgenic mice.

## **Revisiting Self-Control Theory: Behavioral Differences Between College Students, Sex Offenders, and Non-Sex Offenders**

Michael Willis and Ms. Shawna Cleary  
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Self-control theory as presented by Hirschi and Gottfredson propose that people who lack self-control are more likely to engage in criminal behavior. Self-control is regarded as a unidimensional trait that is comprised of impulsivity, insensitivity, physical activity preference, risk seeking, shortsightedness, and preference for non-verbal communication. Many argue self-control theory is multi-rather than unidimensional. The present research was conducted to determine which of the six characteristics is a more accurate predictor of self-control. The sample groups included college students and prison inmates. Using the Grasmick scale of self-control, the sample groups were cross analyzed. The results support Hirschi and Gottfredson's notion that self-control is a single unidimensional latent trait composed of six distinct traits.

