
**28TH ANNUAL
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CALIFORNIA
RESEARCH
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**PROCEEDINGS
OF THE
2007 SYMPOSIUM**

**Convened on
Thursday, April 12, 2007
in the
University Business Center
California State University, Fresno**

**TWENTY-EIGHTH ANNUAL
CENTRAL CALIFORNIA RESEARCH
SYMPOSIUM**

PROCEEDINGS

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California State University, Fresno

Thursday, April 12, 2007

POSTER PRESENTATION ABSTRACTS

(IN NUMERICAL ORDER BY POSTER BOARD NUMBER)

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Poster Session I, Poster Board No. 1

Understanding and Preventing Relational Aggression in Adolescent Girls

The purpose of this article is to provide an overview of previous literature on understanding relational aggression of adolescent girls, with specific aim at making this information relevant towards prevention programs and educational institutions. This research draws upon scholarly sources regarding the definition, social and emotional development aspects, and consequences of relational aggression. Literature on peer and familial influences are examined. The article concludes with a discussion for further research based on works by Roslind Wiseman and Mary Pipher. Their programs are constructed to increase prevention and awareness efforts for relational aggression. Furthermore, the article should form the basis for future research in the issue of relational aggression.

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Poster Session I, Poster Board No. 2

Modeling Radio Interference to Spacecraft Tracking

A model is proposed for estimating the probability that interference originating from radio transmissions in the Los Angeles area will adversely affect the tracking of spacecraft at the NASA complex in Goldstone, California. The tracking stations at the Goldstone complex employ radio receivers that must be sensitive enough to detect weak radio signals arriving from spacecraft in all parts of the solar system. These radio receivers are, in fact, among the most sensitive in the world. This sensitivity makes them vulnerable to interference arising from commercial radio transmissions.

The 37,000–38,000 MHz frequency band is employed by NASA for telemetering data from spacecraft to the Goldstone tracking complex. This same band is also available for the unrelated purpose of commercial wireless communications. Commercial activity in the 37,000–38,000 MHz band is being planned for the Los Angeles area. Although the Goldstone complex is separated from metropolitan Los Angeles by the San Gabriel and San Bernardino Mountains, some of the radio waves from Los Angeles will hurdle the mountains by scattering in the troposphere. In order to assess the risk to the space program, it is essential to model the accumulation of interference appearing at Goldstone due to a great number of radio transmitters that are distributed around the Los Angeles metropolitan area. Such a model is proposed here, and the model is used to calculate the probability that the tracking of a spacecraft is adversely affected.

The proposed model is probabilistic, accounting for variability in the meteorological conditions that determine the degree of tropospheric scattering. Although the complexity of the model precludes an analytical solution, a computer program has been written that simulates the random variables. With this program a probability has been calculated that a future tracking event will be compromised.

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Poster Session I, Poster Board No. 3

Immediate Operation versus Initial Conservative Management of Appendiceal Mass in Children

Introduction: Appendicitis is the most common pediatric surgical emergency. Controversy exists in the management of appendiceal mass in children. Some surgeons prefer non operative management followed by interval appendectomy while others support immediate appendectomy.

Methods: This study compares the outcome of immediate operation and conservative treatment of appendiceal mass in children. 49 patients who presented to Children's Hospital Central California at Madera in 2003 with appendiceal mass were retrospectively analyzed.

Results: The mean age was 7.2 +/- 4 years. The first group included 16 children who underwent operative intervention within the first 24 hours of admission. The second group included 33 children who were managed conservatively followed by interval appendectomy. The complication rate in group 1 was 43%. Post operative wound infections or abscesses occurred in 7 patients. Laparoscopic appendectomies could not be performed in 3 patients: 2 cases were converted to open appendectomies while 1 patient required another laparoscopic appendectomy 3 months later. In group 2, the complication rate was 27 % (significantly less than group 1, $p = 0.048$). Interval appendectomy was performed between 2-4 months. 1 patient did not respond to conservative treatment. 3 patients developed postoperative abscess after interval appendectomies. 6 patients returned at 7, 10, 30, 50, 56 days respectively after initial conservative treatment with recurrent symptoms that required either intravenous antibiotics or drainage. Mean hospitalization duration did not reveal statistical significance between the two groups: 13 +/- 0.9 days in group 1 versus 21 +/-1.4 days in group 2 ($p = 0.065$). Operative time was comparable: 53 minutes in group 1 and 65.8 minutes in group 2 ($p=0.09$). Hospital billing charges were significantly higher for group 2 (\$46,776 +/- 2, 400) than group 1 (\$30,901 +/- 1,100) ($p=0.038$)

Conclusion: It is concluded that conservative treatment of appendiceal mass is safe albeit more costly. Interval appendectomy is recommended because of possible risk of recurrence.

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The Universal Appeal of James Bond: Mythological Mystery Man

"Bond, James Bond" famous words that have lived on through generations of Bond films, books, and articles written about Ian Fleming's creation, James Bond. Moreover, Chapman, James. "A License To Thrill: A Cultural History of the James Bond Films", (I.B. Tauris & Co Ltd) Examines the James Bond films not only as entertainment, but works of art that have contributed greatly to cinema and the culture of the times and beyond. Also, the James Bond novels are mentioned as having a great deal to do with Bond's popularity. However, few studies have focused extensively on the subconscious reasons for his appeal. In this study I will show that his character's allure lies not only in the kind of life he leads on the edge, the numerous gadgets at his disposal, the beautiful women he comes across and the plethora of maniacal enemies, but his connection to mythology is the real reason beneath the surface that Bond is so well-liked among both men and women. Joseph Campbell's "The Hero with a Thousand Faces" looks at how archetypal themes show themselves through countless mythologies within the central universal theme of the Hero's Journey. It is this journey that is perhaps one of the more crucial aspects to James Bond's appeal.

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Poster Session I, Poster Board No. 5

Geo-Spatial Modeling of Wine Grape Quality Using GIS

Production of high quality wine requires high quality grapes. Variability in fruit quality exists in many vineyards for a variety of reasons. Without differential harvesting, wine quality derived from the fruit in any given vineyard is only as good as the blend of high and low quality fruit. Segregation of wine grapes based on quality has typically been accomplished by hand harvest. However, due to increasing labor costs, there is a growing need to mechanize this task. The typical quality indicators for red wine grapes are anthocyanin and Brix. Anthocyanins contribute most of the color to red wine while Brix indicates sugar content, which is commonly used to determine harvest date. Anthocyanin and Brix levels were measured at 437 geo-referenced sites in a 45 acre Cabernet Sauvignon using a portable near-infrared (NIR) spectrometer. The vineyard is located near Lodi, California. ESRI ArcGIS 9.1 was utilized for the geo-spatial modeling and analysis of these quality indicators. Subsequently, the anthocyanin data was used to produce a map of 'high' and 'low' for the vineyard. The anthocyanin concentration used to differentiate between high and low quality was above or below 0.87 mg anthocyanin/g fruit respectively. Based on this map a "shape file" was produced and used to control a Korvan 3016XL mechanical grape harvester. Three 40 tons lots of wine grapes representing the standard field blend, high anthocyanin and low anthocyanin were differentially harvested. These were fermented separately at the Woodbridge facility of Constellation Wines US a major cooperator in this project. The wines are currently being subjected to analytical and taste panel analysis.

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Synuclein and Its Role in Parkinson's Disease

The SNCA gene encodes alpha synuclein, a member of the family that also includes beta synuclein, and gamma synuclein. The protein is small (140 amino acids) and contains an N-terminal α -helical region, a hydrophobic central component and an acidic C-terminal region. Alpha-synuclein behaves like apolipoproteins. In adult mammals, synuclein expression is generally higher in brain regions that are most obviously involved in ongoing experience dependent synaptic modification. Parkinson's disease (PD) affects 5 % of the general population by the age of 85, whereas early-onset disease is infrequent. Pathologically, neuronal loss is observed for the pigmented, dopamine producing neurons of the substantia nigra while Lewy bodies containing aggregated alpha-synuclein are found in surviving cells of the brainstem. Alpha synuclein has been specifically implicated in Parkinson's disease (PD). Two autosomal dominant mutations have now been identified that segregate with familial Parkinsons Disease – A53T, and A30P substitutions. Subsequently, it was discovered that genomic duplications and triplications at the SNCA locus can also cause autosomal dominant, early onset PD.

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Poster Session I, Poster Board No. 7

**The Prevalence and Resident Knowledge of Metabolic Syndrome
in Santa Cruz, Bolivia - Hospital Universitario**

Purpose: Bolivia, like many other developing countries, is facing the challenge of providing basic preventive health services while at the same time the population is shifting toward more complex and chronic medical conditions. The purpose of this study was to measure the prevalence of metabolic syndrome in hospitalized patients in Santa Cruz, Bolivia and to survey the Bolivian internal medicine residents on their knowledge about this syndrome.

Methods: During a 4-week period in January and February of 2005, all hospitalized medicine patients at the Hospital San Juan de Dios were assessed for the presence of metabolic syndrome. In addition the Bolivian medicine residents received several lectures on metabolic syndrome and their knowledge about metabolic syndrome was post-tested through a written 17-question exam.

Results: 56% of the female hospitalized patients were overweight with a body mass index (BMI) > 25. This compared with only 27% of the male hospitalized patients. 17% of the female patients and 6% of the male patients were obese (BMI > 30). Overall, the metabolic syndrome was found in 80% of females and 3% of males ($p < 0.0001$). The mean score on the resident exam of medical knowledge of metabolic syndrome was 43% correct responses.

Conclusions: Overweight and obesity is much more common in the female than male hospitalized patient population in Santa Cruz, Bolivia. The metabolic syndrome disproportionately affects females more so than males. Despite the high prevalence of female obesity and metabolic syndrome the Bolivian medicine residents had low levels of knowledge about this syndrome.

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Poster Session I, Poster Board No. 8

**Automated Computer Assessment of Carotid Artery Stenosis
from 3D Medical Datasets Acquired by Computer**

Objective: To design an automated computer program for the assessment of the carotid artery from datasets acquired by Computer Tomography Angiography (CTA). The CTA studies of stroke patients were processed using the computer program and compared to the visual evaluation by a neuroradiologist to determine its accuracy.

Methods: The computer program requires minimal human interaction. First, it segments the lumen and the wall of the carotid artery by a combination of various image-analysis techniques such as edge-detection, curve-fitting, boundary-tracing, nearest-neighbor-interpolation and curvature-directed 2-D interpolation. The software then gathers various anatomical information, such as the degree of luminal narrowing, the wall thickness, and the amount of calcium clusters. The computer assessments were compared to the findings of the neuroradiologist. The association between CTA measurements and the risk of stroke was evaluated.

Results: The study population consisted of 125 patients. 74 had no stroke/TIA, 18 had a TIA, and 33 had a stroke. There was excellent agreement between the neuroradiologist's visual assessment and the automated computer evaluation of the carotid stenosis ($\kappa = 0.918$, $p < 0.001$). The percent of diameter narrowing and the percent of area narrowing have the best correlation. Carotid wall thickness was the CTA parameter showing the strongest association with the risk of stroke.

Conclusion: The automated computer algorithm for quantifying the degree of carotid stenosis is reliable and shows high concordance with the interpretation of an experienced neuroradiologist. It is capable of processing a series of >100 CT slides in ½ hour, thus speeding up the diagnosis; it would have taken much longer if done manually. The results demonstrate a stronger association between the wall thickness and the risk of stroke. This association has yet to be confirmed in prospective studies with adequate sample size to demonstrate statistical significance.

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**A New Planar Chiral Ferrocenyl Aminophosphine Ligand for Ru(II)-Catalyzed
Asymmetric Transfer Hydrogenation of Acetophenone Derivatives**

Ferrocene ligands with planar chirality have become excellent ligands for Ru(II)-catalyzed enantioselective transfer hydrogenation of aromatic ketones. We have synthesized a new chiral, ferrocene-based aminophosphine ligand to study its effectiveness in this reaction. In this study, 2-diphenylphosphino ferrocenecarboxaldehyde was synthesized using a chiral auxiliary. Using an enantiomerically-pure chiral amine, the chiral phosphino-aldehyde was converted to the corresponding imine and then reduced to produce a chiral ferrocenyl aminophosphine ligand. This new ligand was characterized by spectroscopy (NMR, IR) and polarimetry. The ferrocenyl aminophosphine ligand so produced was used to prepare the ruthenium(II) catalyst precursor for the asymmetric transfer hydrogenation of a variety of acetophenones. Synthesis, characterization, and results of catalytic asymmetric studies will be presented.

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**Synthesis and Characterization of a New Ruthenium(II) Catalyst
for Asymmetric Transfer Hydrogenation of Acetophenone Derivatives**

The demand for new optically pure intermediates by the pharmaceutical industry has triggered a search for new methods of asymmetric catalysis. In particular, asymmetric reduction of C=O and C=N bonds to the corresponding alcohols and amines, respectively, remains a significant and fundamental reaction in the synthesis of pharmaceuticals. Chiral, aminophosphine-based Ruthenium(II) complexes have been shown to catalyze these reductions asymmetrically under mild conditions. In this study, a chiral aminophosphine ligand was synthesized from readily available D- or L-alpha-methylbenzylamine. The Ru(II) complex of this ligand was then used as a catalyst precursor for the asymmetric reduction of acetophenone derivatives. Optimal reaction conditions, characterization of the ligand/catalyst and the alcohol product, as well as the enantioselectivity of the reaction, will be discussed.

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Poster Session I, Poster Board No. 11

Tsunami Awareness on the Coast of Washington State

Tsunamis pose a potentially hazardous threat for the coast of Washington State. As tsunami activity becomes more frequent around the world, many organizations have been developing awareness programs to protect its citizens. One such organization is the Washington State Emergency Management Division which developed a pilot program for disaster preparation for the hotel/motel industry. Presentations and surveys were conducted for those businesses interested in tsunami preparedness. Two surveys were used throughout the study to find out what staff members of these businesses knew about tsunami preparedness. Surveys were distributed to each participant before the presentation began and at the conclusion of each presentation. This method was chosen to find out what employees learned from participating in this workshop. Results showed that management and staff needed tsunami evacuation maps in order to evacuate their guests and visitors effectively to their assigned assembly areas. It was also found that staff members believed it to be important to prepare supplies ahead of time should a tsunami occur. Although this study was done on a smaller scale, this type of research needs to be done on a larger basis to cover a sizeable scale to cover a larger percentage of the coastal hotel/motel industry. If another study like this were conducted, the entire west coast of the United States should be included.

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**The Possibility of Moral Values in an Interpersonal Context:
A Problem in Max Scheler's Phenomenological**

I dispute Scheler's idea that moral value is inevitably a by-product of willing non-moral ends. The first part of the paper aims at providing a brief overview of Scheler's phenomenological ethics. I then evaluate two opposing arguments for whether moral values surface in willing the realization of non-moral values. I argue that the picture of moral interaction captured in Scheler's valuation is too simplistic. Moral values become extant only within the interaction of persons in which my actions either directly or proximately affect another. To capture this reality more accurately, I argue for the use of the term "interpersonal transactional categoriality" rather than "intersubjective," as used by Phillip Blosser.

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Poster Session I, Poster Board No. 13

**Convergent Evolution of Antifreeze Proteins:
Bioinformatics of the Genes and Proteins**

Antifreeze proteins (AFPs) and antifreeze glycoproteins (AFGPs), collectively abbreviated as AF(G)Ps, are synthesized by various organisms to enable their cells to survive in subzero environments, by binding to the nucleating ice crystals. These proteins show great diversity in structure, and they have been found in a variety of organisms.

Antarctic notothenioid fishes and several northern cods are phylogenetically distant, yet produce near-identical AFGPs to survive in their respective freezing environments. In a land mark paper Chen et al., (1) have shown that AFGP gene sequences and substructures provide strong evidence that AFGPs in these two polar fishes in fact evolved independently.

Evolution is a process that takes many years for significant change to occur. As a species evolves to survive, physiological changes occur at both the genetic and protein level. These changes allow for the species to exhibit new behaviors, adapting to the changes in their environment. Molecular evolution of AFGPs is an excellent model to understand the influence of environmental changes on the evolution of the species.

In this research we report bioinformatics based results on the molecular evolution with reference to the respective genes and proteins. Genetic similarities are analyzed from differences in the melting temperatures; the protein sequences are then characterized using a combination of sequence alignment techniques, and by defining an entropic cost for sequence conservation. Our results will lead to a better understanding of the influence of environmental changes vs. natural selection in molecular evolution.

1. Chen, L.B., Devries, A.L. & Cheng, C.H.C. (1997) Convergent evolution of antifreeze glycoproteins in Antarctic notothenioid fish and Arctic cod. Proc. Natl Acad. Sci. USA 94, 3817–3822.

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Poster Session I, Poster Board No. 14

Assistive Technology Service Delivery: A Multidisciplinary Perspective

The purpose of this study is to summarize findings from a systematic exploration of existing literature and views regarding human service professionals' roles in assistive technology service delivery. To date, there is no consolidated picture of this multidisciplinary trait. A comprehensive description and evaluation of roles is a necessary step, then, to guide service providers, educators, and administrators.

This study is based on a review of 62 referred journal articles that focused on the roles of human service professionals in assistive technology service delivery. A comprehensive search of the literature was conducted based on two criteria. First, all articles were selected exclusively from refereed print or online journals. Conference papers or reports were not included in this review. Second, the focus of these articles had to be on assistive technology service delivery. Acceptable acronyms for assistive technology are as follows: (1) adaptive technology and (2) rehabilitation technology.

Six key components of service delivery emerged from this review: (1) Information, (2) Prescription, (3) Assessment, (4) Delivery, (5) Financing, and (6) Maintenance. These components were analyzed based upon the percentage of involvement of the following professionals: (a) Rehabilitation counselors, (b) occupational therapists, (c) physical therapists, (d) speech-language pathologists, (e) educators, and (f) health care providers. It is concluded that tasks between professionals overlap significantly, which led the author of the study to propose a collaborative computing software program, CollaborAT, to establish a multidisciplinary connection between professionals.

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Poster Session I, Poster Board No. 15

**Enzyme Linked Immunosorbent Assay
For Quantification of B. Thuringiensis Toxins**

Background: Transgenic cotton cultivars engineered to express toxins from *Bacillus thuringiensis* (Bt), which include WideStrike® (Dow AgroSciences, Indianapolis, IN) and BollgardII® (Monsanto Corporation, St. Louis, MO) brands, have been genetically engineered to produce the Cry1F, Cry2Ab and Cry1Ac proteins that, when in the presence of Lepidopteron digestive enzymes, cause microporation of the gut lining and effectively kill the pest. Quantification methods range from PCR for gene presence, in-field flowstrips for rapid analysis and microscopy for the presence of the crystal toxins. A quick and efficient method for toxin quantification has been the immunoassay, or ELISA. Cotton plants were grown under differing growing regimes, and leaf tissue was freeze dried for analysis. Previous data showed levels of toxin would be affected by the stresses (Dong and Li 2007).

Methods: An ELISA kit specific to Cry1Ac toxin (Strategic Diagnostics, Newark DE) was used with a modified preparation procedure optimized for quantification of the toxin. Freeze-dried leaf tissue was suspended in buffer, and samples were assayed and toxin level was quantified using SoftMax Pro software (Molecular Devices, Sunnyvale, CA)

Results: Results showed that stressed cotton plants, grown under excessive moisture and insufficient light regimes, had less toxin present than normally reared plants. These results are consistent with previous analyses.

Conclusions: This ELISA procedure is sufficient for quantifying Cry1Ac toxin.

References: Dong, H.Z. and W.J. Li. Variability of Endotoxin Expression in Bt Transgenic Cotton. *J. Agronomy and Crop Science*. 2007. 193: 21-29.

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Utilization Characteristics of CT Colonography in a US Veteran Population

Introduction: Screening has been shown to reduce the morbidity and mortality from colorectal cancer. Currently there are several options for colon cancer screening, all of which have advantages and disadvantages. A recent addition to the options for colon cancer screening has been CT (computerized tomography) colonography. While several studies have been done evaluating this technology in specialized centers, studies have not been done to evaluate its use in a routine clinical setting. The objective of this preliminary study was to evaluate the clinical utility of CT colonography in a US Veteran population.

Methods: This study was approved by the VA Central California Health Care System IRB. All patients undergoing CT colonography over the last 3 years at the VA Central California Health Care System were retrospectively reviewed. Baseline characteristics, indications for use, and diagnostic yield of this test were determined.

Results: A total of 142 CT colonography scans were done over the study period. The average age of the veterans undergoing studies was 68.73 years. One hundred twenty-one studies were ordered by gastroenterologists, the rest by primary care providers and surgeons. The primary indication for CT colonography was an inadequate conventional colonoscopy preparation (76/142; 53.5 %). Significant medical co-morbidities was the indication for CT colonoscopy in 43 of 142 studies (30%). Overall polyps were detected in 23 studies (16.2 %). Extra intestinal findings on the CT colonography were found in 67 patients (47.2 %). Three studies demonstrated colonic masses or cancer. Eighty-six studies (60.5%) were limited in some way from optimal exams. The most common reasons for suboptimal study were residual stool or suboptimal distension.

Conclusions: CT colonography can be useful in selected patients; however, there are limitations which may reduce the sensitivity in detecting polyps. The majority of our studies were done in patients who had failed colonoscopies or were not good medical candidates for colonoscopy. Suboptimal distension and preparation may limit the usefulness of CT colonography for colon cancer screening. Further studies into the outcomes of patients undergoing CT colonography are needed to determine its role in colon cancer screening.

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Poster Session I, Poster Board No. 17

Impact of Ego Identity Status and Adverse Childhood Experiences on Temperament Clarity

Our research team is exploring correlations between familial experiences, personal and relational development and temperament typology. Temperament clarity is measured using the preference clarity index (pci) of the Myers-Briggs Type Indicator and demonstrates the clarity of a subject's preference for one particular temperament category over its polar opposite. Our study examines questions of whether or not temperament clarity is related to maturity and if temperament clarity can be suppressed by adverse childhood experiences.

One temperament theory proposes that as a person matures, his or her temperament becomes more solidified—that a clearer temperament preference demonstrates a stronger sense of self. We desired to see if this correlation between temperament clarity and maturity exists by comparing pci to ego identity status, measured by the Ego Identity Process Questionnaire. Ego identity is the sense of individuality one has combined with his or her confidence in defining his or her self in four different domains: occupation, religion, politics, and values. In our study, a sampling of 84 university students revealed no significant correlation between pci and ego identity status. This may suggest that temperament clarity naturally exists on a wide continuum through out maturity. Further implications of the results are being explored.

Adverse childhood experiences (ACE) are defined as negative childhood experiences that involve child neglect and abuse, parental alcohol and drug abuse, or marital and family discord. Our study explores whether these negative experiences are correlated with temperament expression later on as the adolescent emerges out of the family into adulthood. Preliminary analysis reveals a negative correlation between pci and ACE. This suggests that adverse childhood experiences can inhibit a clear preference for temperament types later on in development. We are also in the process of examining the results to see if pci shows stronger correlations to certain forms of ACE compared to others.

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Poster Session I, Poster Board No. 18

Post Treatment Complications of Botulism Type A and B: A Review of Four Cases

Botulism is a rare, life threatening disease caused by the neurotoxin of the spore-forming anaerobic bacterium, *Clostridium botulinum*. There are at least three types of botulinum toxins that affect humans, type A, B and E (1).

The symptoms of patients who were infected with botulism in previous case reports were described as follows : symmetric flaccid paralysis of the extremities, autonomic dysfunction and external ophthalmoplegia. In most cases their motor nerves were affected as well as their cranial nerves, which caused blurred vision, diplopia and dysphagia (1). We present four patients who were found to have botulism of either type A or B. Three patients were using IV heroin and one had ingested a four day non refrigerated carrot juice. All patients had moderate to severe respiratory symptoms at the initial presentation, three had to be intubated immediately upon admission. Within about a week, three of four patients went on to develop further complications of both motor and sensory neuropathy, mimicking Guillain-Barre Syndrome and one developed symptoms mimicking Myasthenia Gravis. All four patients had antitoxin administration within 24-48 hours of hospitalization. Three of the four patients developed complications and remained in the intensive care unit (ICU) due to failure to wean from the ventilator. One of the four patient stayed about two weeks in the ICU. We sent blood samples of these patients to Central Disease Control for examination. It is interesting to note that the three patients with complicated lengthy hospital course had type A botulism, and the one less complicated patient had the type B strain. It is known that the type A strain is more virulent than type B botulism. Two of the patients who had type A botulism developed severe sensory motor neuropathy following antitoxin treatment. Until these patients received treatment of IVIG (intravenous ImmunoGlobulin) therapy, there were no improvements in their cranial neuropathies or in respiratory function. After receiving IVIG, the patients showed marked improvements of cranial neuropathies. Their hospital courses seem to be shorter than in some previous case reports. One patient with type B botulism had a favorable outcome with the shortest length of hospital admission as compared to the others. We are hoping to emphasize the importance of early detection of botulism symptoms with immediate intervention, including recognition of some of the unusual patterns of presentation of type A botulism.

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Unexpected Death in Children 0-5 Years-Old

Introduction: Preventable injury is the leading cause of death among children in the United States despite national initiatives to improve the safety of children and their environments. Over 10,000 children die each year from injuries; more than from all diseases combined. The purpose of this study is two fold 1) to determine the distributions of cause, manner and circumstances of sudden unexplained death of children ages 0-5 in Fresno County, and 2) to index the specific institutional opportunities of this County's human service agencies to prevent future deaths and make recommendations to these agencies.

Methodology: Data was retrospectively collected from Fresno County Coroner's investigative records for all sudden, unexpected deaths of children 0-5 years-old between 2000 and 2006. Demographics, manner, cause, caretaker, location of incident and death, agency involvement, and the circumstances surrounding each death were entered into a database for analysis. Fetal demise and stillbirth cases were excluded.

Results: Information was collected on 162 deaths of young children 0-5. In our sample more males died (65%) than females (35%). Hispanic youth accounted for the majority of deaths (59%) then White (23%), black (12%), Asian (5%), Native American (<1%). Frequency of death was an inverse function of age: specifically, age 0-11 months 89(55%) deaths, age 1 year-old 25(15%), age 2 years-old 19(12%), age 3 years-old 13(8%), age 4 years-old 8(5%), and 5 years-old 8(5%). 11.7% had CPS involvement compared to the national average for all children of 1.3%.

Conclusion: Ethnicity is not associated with risk; however more boys than girls die each year who are 0-5. Accidents are the leading manner of death with the leading causes being Motor Vehicle Collisions and drowning. The youngest children are at the highest risk and CPS involvement is alarmingly high.

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Poster Session I, Poster Board No. 20

Cultural Framework and Anger Expression in Russian Immigrant Women

Cross-cultural studies of immigrants indicate that acculturation is frequently stressful; adjusting immigrants can manifest symptoms of anger, anxiety, and depression (Bochner, 1994). Immigrants' adherence to a certain cultural framework can play a role in the adjustment process, and provide valuable clues for where a certain individual is within this process. During this difficult time in immigrants' lives, mismanaged anger symptoms can lead to adverse health problems, which are likely unwanted additives to the already challenging existence for them.

The present study aimed to investigate the following questions: (1) Are individualistic and collectivistic cultural frames associated with different types of anger expression? (2) Are individualistic and collectivistic cultural frames associated with health status? (3) Are different types of anger expression associated with health status? (4) Does cultural frame interact with anger expression in predicting health status? The study recruited a convenience sample of 76 Russian immigrant women between the ages of 30-65. Each participant was asked to complete the State Trait Anger Expression Inventory – II (STAXI-2), Ware's Short Form-12 Health Survey version 2 (SF-12v2), and the Self-Constraint Scale (SCS) questionnaires, as well as a supplemental demographic survey, in either English or Russian, as they chose. Two hierarchical regression analyses were used to address the research questions. Preliminary results revealed a significant negative relationship between anger-in and mental health, as well as collectivistic cultural frame and mental health. In addition, those adhering to the individualistic cultural frame showed a positive relationship with good physical health.

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Poster Session I, Poster Board No. 21

Adsorption Kinetics of Antifreeze Glycoproteins

Anti-freeze glycoproteins (AFGPs) refer to a unique class of biomolecules found in fishes that allow for their survival in a sub-zero environment via freezing point depression of water. The resulting difference between the melting point and freezing point is termed thermal hysteresis—a term used to quantify the respective antifreeze activity of AFGP molecules. AFGPs exhibit non-colligative freezing temperature depression 300-500 times more effective than the colligative depression observed for typical solutes. There are at least eight closely related glycoproteins and glycopeptides ranging in molecular weight from 32,000 to 2,600 g/mol; these molecules are classified AFGP1 to AFGP8 in order of decreasing size. In general, AFGP8 has weaker antifreeze activity than the AFGP1. However, in mixtures of both, their activities are additive as cooperative potentiation occurs and the full activity of AFGP8 is liberated. The purpose of this research project is to develop a mathematical model to explain the unusual thermal hysteresis of a mixture of AFGP8 and AFGP1. Our approach regards the AFGP-ice interaction to be analogous to a non-specific substrate-ligand interaction; the binding isotherm is modeled for cooperative affinity. Furthermore, the model should be able to explain such phenomena as cooperative potentiation, as well as relate physical properties of the AFGP molecule to the observed thermal hysteresis. Understanding the binding nature will lead to a comprehensive knowledge on the fundamental molecular mechanism of action of this unique class of proteins. The unique inhibitory function of anti-freeze protein molecules provides great potential for cryo-industrial usages such as preservation of tissues and cells, as well as maintaining the quality of frozen materials.

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Poster Session I, Poster Board No. 22

**Normative Data for the Gaze Stabilization Test (GST) Protocols
on the in Vision™ for High Performance Athletes**

Balance, or the ability to maintain one's center of gravity over a static or dynamic base of support, is made up of two interdependent but separate systems: gaze stabilization and postural stabilization. Gaze stabilization maintains gaze direction of the eyes and visual acuity during active head and body movements and is reliant on the visual and vestibular systems, muscular control of eye movements and the activity of the brain to integrate this sensory and motor information. Gaze stability is necessary for safe, coordinated movements in non-athletes, and even more so for the competing athlete. The purpose of this study is to collect normative data for maximum head velocity for gaze stabilization in high performance athletes to determine if the demands of sport have an effect on this ability.

Seventy-five NCAA Division I athletes from California State University, Fresno were recruited using a sample of convenience. Athletes were tested if they had participated in their sport for a minimum of 5 years, had maintained a consistent training record for 2 years and who had good health standing were tested using the gaze stabilization test (GST) protocol for the inVision™ by Neurocom International, Inc. in all three dynamic head movements (horizontal, vertical and roll). Actual head velocity (degrees/second) scores were compared to a sample of seventeen non-athletes.

Mean scores in degrees/second are reported for all athletes tested in three planes of head movement (horizontal, vertical and roll): 127 + 29 (s.d.), 104 + 29 (s.d.) and 95 + 30 (s.d.), respectively. Mean scores for non-athletes are 114 + 25 (s.d.), 81 + 19 (s.d.) and 71 + 25 (s.d.).

Results confirm there is statistically significant difference between athletes and non-athletes for vertical and roll dynamic head movements, indicating a forced demand for these head movements during sport compared to non-athletes.

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Poster Session I, Poster Board No. 23

Synthesis and Characterization of One Dimensional ZnO Nanostructure

The semiconductor ZnO nanostructures are attracting increased attention in the science and technology communities partially because of their wide energy band gap (3.37 eV) and large exciton binding energy (60 meV). Potential applications of ZnO nanostructures are spreading from light emitting diodes and lasers, solar cells, photodetectors and optical switches. Here we present the synthesis of ZnO nanostructures including nanowires, nanobelts, and nanopillars. The as-grown ZnO nanostructures are strongly related to synthesizing temperature: lower temperature producing thin film, medium temperature producing crystalline nanoparticles, higher temperature starting one dimensional nanowire formation. With optimal temperature at high end nanowires in varying morphology are produced. It is our desire to create nanostructure of proper structure, chemical property and polarity. A technique used to synthesize ZnO nanowires is chemical vapor deposition via vapor liquid solid mechanism.

During ZnO nanowire growth, reactant molecules (precursors) in vapor phase were fed into the reaction region. The surface of the liquid catalyst has a large accommodative coefficient relative to the substrate, and therefore are the preferred sites for fragment nucleation. The liquid becomes supersaturated with the absorbed material and a solid segment growth occurs. Because the precipitation point of the absorbed material the catalyst remains in the liquid phase and continues to absorb fragments, thereby establishing wire formation. As this process progresses, the liquid lifts off the substrate surface due to the formation of the solid nanowire beneath it. A whitish film with abundant nanowires can be obtained on the substrates. Scanning and transmission electron microscopes (SEM and TEM) methods were used to examine shapes and sizes of nanostructures while energy filtered TEM (EFTEM) and electron energy loss spectroscopic (EELS) were used to examine the chemical composition of the as-grown nanostructures and verify their composition of zinc and oxygen to form ZnO.

Polarity of the ZnO nanopillar was determined with convergent beam electron diffraction (CBED) method, allows for unambiguous determination of the crystal polarity. In the present study ZnO nanostructures morphology with temperature dependence were studied using both SEM and TEM methods, their crystal structure and chemical composition were examined by electron diffraction contrast imaging which identified the nanopillars and chemical composition was determined by EFTEM chemical mapping and EELS spectra, respectively indicating composition of zinc and oxygen to form ZnO and studied CBED method indicates that the nanopillars were grown with Zn-polarity. Synthesis of nanowires and nanopillars were successful. We intend to further investigate nanostructures synthesis as they make possible and or enhance their applications in optical, electric areas.

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Poster Session I, Poster Board No. 24

Quantification of Volatile Organic Compound Emissions from California Dairy Facilities

The San Joaquin valley suffers from a serious and growing air pollution problem. During the summer, persistently high levels of ozone build up within the region, which exacerbate health problems such as asthma. Ozone is formed in chemical reactions involving volatile organic compounds (VOCs) and oxides of nitrogen (NO_x). According to the California Air Resources Board, dairy facilities are the largest source of VOCs in the valley and volatile fatty acids (VFAs) account for over 50% of these emissions. However, these estimates are controversial because fluxes of VFAs from California dairies have not been accurately measured.

In this work, a method has been developed to quantify emissions of VOCs using a flux chamber coupled to a solid phase microextraction (SPME) sampling chamber, with analysis by gas chromatography with mass spectrometry. Method parameters were optimized for the analysis of C₂ – C₆ carboxylic acids. The method was tested in the laboratory using samples of silage and total mixed rations (TMR) collected from two local dairies.

A total of thirty previously undetected VOCs have been identified in emissions from silage and TMR samples. C₂ – C₅ carboxylic acids were found to be present in all samples. Emission rates of VFAs from fresh silage samples are of the order of 10 mg/hour/m² with acetic acid as the dominant species. The emission rates decrease by roughly an order of magnitude over a twelve hour period. The technique will be used for in-situ emission measurements from dairies, which will ultimately result in a more accurate assessment of the contribution of VFA emissions from dairies to the region's air quality problems.

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Poster Session I, Poster Board No. 25

A Key to Brachyuran Megalopae of the San Francisco Bay Estuary

In 1992, the Chinese mitten crab, *Eriocheir sinensis*, was discovered in the San Francisco/Delta system. Since its introduction the Chinese mitten crab has become a nuisance species. Explosions in adult populations can potentially have a negative effect on the native species of the area through competition and predation. Other adverse effects of the mitten crab are caused by juveniles that include stream bank and levee erosion through burrowing behavior and interference with commercial fisheries through gear destruction and bait stealing (Veldhuizen, 1997). If population explosions can be predicted, preparations can be made for the negative effects caused by the down stream migration of mitten crab juveniles. The mitten crab post-larval stage, the megalopae, are thought to use tidal currents to migrate from brackish water to fresh water environments where they metamorphose into juveniles (Rudnick, 2005). Year-class strength of juveniles may be predicted by megalopae abundance, in correlation with temperature, salinity and tidal currents. Megalopae abundance can be determined with light traps and plankton tows. Presently, there is no mechanism to identify the megalopae species in the San Francisco Bay/Delta system. The objective of this study is to create a dichotomous key of the brachyuran megalopae species of the San Francisco Bay system, thus allowing us to identify and quantitate *E. sinensis* megalopae. Using characteristics obtained from published literature, a key was generated to identify 13 species in the families Cancridae, Grapsidae, Majidae, Pinnotheridae, and Xanthidae. Illustrations of each megalopae species was obtained from published literature.

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Poster Session II, Poster Board No. 1

Light Intensity Effects on Structure and Development of Vegetative and Reproductive Leaves of Podophyllum

Leaves of Mayapple exist in either vegetative (Vr) or reproductive (Rr) form. As light intensity varies widely in the species' natural understory environment, this study examined the effects of high (H, 550 $\mu\text{mol m}^{-2}\text{s}^{-1}$) and low (L, 80 $\mu\text{mol m}^{-2}\text{s}^{-1}$) illumination on Vr and Rr leaf characteristics. Hypotheses were that low illumination levels would (1) reduce leaf expansion rate, (2) increase leaf specific leaf area; and (3) increase final leaf area. Leaves in low illumination exhibited reduced leaf expansion rate relative to H leaves (L: 0.361 ± 0.032 vs. H: 0.457 ± 0.034 cm/d; $P=0.020$), although Rr leaves were larger at emergence than Vr leaves ($P=0.012$), leaf form did not affect expansion rate ($P=0.702$). The illumination effect on leaf expansion was transient, as both leaf forms achieved 90% of final leaf length in 13.0 ± 2.2 days (form: $P=0.242$; illumination $P=0.643$). Specific leaf area (cm^2/gDW) was affected by illumination ($P<0.001$) and leaf form ($P=0.027$); L leaves had ~24% greater SLA than H leaves and Rr leaves had 5% lower SLA than Vr leaves. In spite of lower SLA in L leaves, final leaf area was unchanged by illumination level, but Rr leaf final area (375 ± 35 cm^2) exceeded Vr leaf final leaf area (291 ± 35 cm^2 , $P=0.013$). Low illumination leaves possessed ~32% greater chlorophyll concentration ($P<0.001$) and ~7% lower chlorophyll a/b ratio ($P=0.017$) than H leaves, but, leaf form did not affect either total chlorophyll ($P=0.248$) or chlorophyll a/b ratio ($P=0.536$). Hypotheses 1 and 3 were not supported, but Hypotheses 2 was supported as SLA increased under L conditions. It appears that Mayapple leaves compensate for reduced photosynthesis in L conditions by increasing SLA and chlorophyll concentration to enhance light capture. This is further supported by preliminary chlorophyll fluorescence measurement in Vr leaves showing no effect of growth light level on electron transport rate.

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Poster Session II, Poster Board No. 2

Selection of Extraction Conditions for Phenylephrine in Clandestine Methamphetamine Laboratory Case Samples

Phenylephrine is a nasal decongestant that has been reintroduced to many over-the-counter cold and allergy medications after federal regulations on the sale of pseudoephedrine took place in January of 2006. The potential for phenylephrine to appear in clandestine methamphetamine laboratory case samples as a substitute for pseudoephedrine requires that forensic methods be validated for its identification. This project assessed extraction efficiency for phenylephrine using a variety of solvents and aqueous additives.

The extraction efficiency of phenylephrine standard solutions and simulated case samples was assessed using a variety of instrumental techniques including gas chromatography – mass spectrometry (GC-MS), capillary electrophoresis (CE), and UV spectroscopy (UV). Work in our lab confirmed earlier results that traditional base extractions using sodium hydroxide and chloroform or hexane do not allow the extraction of phenylephrine from these samples. The use of ion pairing agents (e.g. ammonium ions), salting agents (e.g. sodium chloride or iodide), and polar solvents (e.g. n-butanol) significantly improved extraction efficiencies for phenylephrine as assessed by both CE and UV. Detection of phenylephrine in these extractions using GC-MS was not initially successful, potentially due a combination of solvent purity issues, poor chromatography, and poor detection limits.

In conclusion, current methods of extraction are not effective for the analysis of phenylephrine. The use of alternate solvents and aqueous additives, including ion pairing agents, has the potential to allow the detection of phenylephrine in these case samples. Work continues in the Person laboratory to resolve issues surrounding the GC-MS analysis of these extracts.

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Refinement of Linguistic Intonation Patterns through Use of Musical Criteria

The object of our study is to show the musical function of pitch in speech (fundamental frequency). The observation of intonation in linguistics has to this point been one of noticing which pitches are higher or lower within the context of the purpose of the utterance. A great deal of cataloging of the features of statements, questions, commands, and interjections has produced a lexicon of contour types. These observations have by and large served the linguistic community in fine fashion. However, when a closer look is taken at the actual musical function of the pitch in the utterance another level of understanding is reached. To this point linguists have used an accurate, though crude system for the transcription of intonation in speech that looks at pitch level alone. There has been no work into the relation of the pitches within an utterance to further classify its context or purpose. Generally the linguistic notation simply falls into five levels: high, mid-high, mid, mid-low, and low. This is an adequate system for simple observation but there is possibility for much refinement by approaching the transcription of pitch from a musical perspective. A statistical analysis of the occurrence of related musical pitches (f_0) within utterances shows that linguistic observations of standard intonation contours can be set down in a more specific manner. These transcriptions have shown the presence of another level of significance in the function of intonation in speech that surpasses the method currently used by linguists. Linguist's observation of intent in utterances can be shown in significant musical ratios that add more specificity to transcription.

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Poster Session II, Poster Board No. 4

**Influence of Mutations on the Folding Transition State of Proteins:
FSD-1 as a Model System**

Characterization of the folding transition-state ensemble is an important step toward a full elucidation of protein folding mechanisms. FSD-1 is a small alpha/beta protein of 28 residues, originally designed based on the backbone structure of a zinc-finger protein domain. Ab initio molecular dynamics simulations of a model protein FSD-1 suggests that the amino-acid sequence can be redesigned by specific mutations to form a more stable protein. Two such de novo designs proteins are FSD-M1 and FSD-M2.

Nuclear magnetic resonance (NMR) spectroscopy provides a powerful way to determine the 3D structures of proteins in the solution state. In this research we have undertaken a structural biology approach to determine the structure and dynamics of the proteins FSD-1 and its two mutants FSD-M1 and FSD-M2. The goal is to validate computational predictions that the mutant proteins are more stable than the wild type. We have collected 2D NMR NOESY (nuclear Overhauser effect spectroscopy) and TOCSY (total correlation spectroscopy) data of these proteins at 15°C and 30°C. The experimental data was analyzed using a combination of sparky (data analysis) and PyMol (visualization) programs. Complete sequence specific assignments of all the three proteins suggest anticipated changes in the specific regions of the spectra that correspond to the mutations. Detailed analysis of the data, preliminary NMR structural characterizations and comparison of the NMR results with computer simulations will be presented. This collaborative research between all-atom molecular dynamic simulations and NMR based structural validation is expected to provide excellent tools to understand amino acid residue level detail of protein folding mechanisms.

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Poster Session II, Poster Board No. 5

Does Dabbing the Skin Surface Dry During Ice Massage Treatment Accentuate Cryotherapeutic Effects?

While ice massage (IM) is a rapid cooling technique used to facilitate therapeutic movements in the rehabilitation process, evidence of its efficacy over alternative therapeutic protocols is scarce. We hypothesized that a clinical IM protocol involving “dabbing” excess water would be superior to a “non-dabbing” protocol in accelerating a reduction in superficial skin temperature.

Sixteen healthy, young adult volunteers, in counterbalanced order received a dabbing (DB) and non-dabbing (noDB) 7-minute IM treatment over the surface of the right or left triceps surae musculature. Minute-by-minute temperature change in skin surface was evaluated using an infrared thermometer. Active (AROM) and passive (PROM) range of motion was evaluated via hand-held goniometer. Force in the triceps surae during passive stretch was evaluated with an algometer. Dependent variables (reported as $M \pm SD$) were tested with between group ANOVA with repeated measures.

Skin temperature was reduced to DB ($5.8 \pm 1.1^\circ\text{C}$) in comparison to noDB ($6.8 \pm 1.4^\circ\text{C}$), evoking significantly greater cooling at 1-min of IM (group X time interaction, $p < 0.01$). However, after two minutes of IM, each method of application evoked the same surface temperature. Neither seven-minute IM technique yielded a significant change in AROM DB (-0.63 ± 2.55) in comparison to noDB (1.18 ± 2.90), or a change in passive-length tension relations ($p > 0.05$).

This study found two to three minutes of ice massage sufficient in cooling the skin surface, independent of dabbing or no-dabbing technique used. The dabbing technique appears to cause a more rapid decrease in surface temperature initially, and is a more practical method of application. Despite method of application, no significant changes were found in AROM, or passive length-tension relationship after 7-minute IM to the triceps surae.

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The Effects of Depression on Anger Expression in Romantic Relationships

Anger expression is an important facet of the maintenance and quality of romantic relationships. Romantic relationships affect the initiation and maintenance of depression. The present study tested the hypothesis that depressed research participants would have a higher likelihood of using anger management strategies associated with inwardly directed anger expression. This study included 198 participants (135 depressed and 63 non-depressed) that were recruited from Fresno State's student counseling center. Participants were asked to complete the brief symptom inventory, the state trait anger expression inventory, and an anger interview. The state trait anger expression inventory measured tendency to use anger expression strategies associated with outwardly directed anger (anger-out), inwardly directed anger (anger-in), and attempts to control the experience of anger before expressing it (anger control in-and anger control-out). The anger interview consisted of 2 situations involving anger provocations by romantic partners. The anger interview responses were then coded by 10 raters on 18 dimensions of anger management strategies. The coders were individually trained and familiarized with the situations, the rating scale, and the DVD format of the videotaped responses to the situations. Depression status was determined by the BSI depression subscale. Distribution of genders was similar across groups and there were no significant age differences between the groups. Analyses of variance indicated that there were no significant differences between depressed and non-depressed participants in terms of anger expression as measured by the State-Trait Anger Expression Inventory. One limitation of the study is that the effect of clinically significant anger was not controlled. Implications for understanding the role of relationships and anger expression in the initiation and maintenance of depression will be discussed.

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Poster Session II, Poster Board No. 7

**The Effect of the Oakhurst Wastewater Treatment Plant
on Fresno River Water Quality**

The objective of this study is to address the influence of the Oakhurst Wastewater Treatment Facility (OWTF) on the Fresno River water quality. The facility had recently been expanded to accommodate 550,000 gallons of waste per day, compared to its previous maximum of 250,000 gallons per day. At upstream and downstream sites established by the 2004 Fresno River Nutrient Reduction Plan, we collected water to measure field parameters indicative of wastewater effluent, including biochemical oxygen demand (BOD), nutrient concentrations, suspended and attached microbial growth, stable isotope ratios ($^{15}\text{N}:\text{}^{14}\text{N}$, $^{13}\text{C}:\text{}^{12}\text{C}$), and total and fecal Coliform bacteria, as well as relevant chemical and physical parameters. Water samples were collected from three sites on the Fresno River, two upstream of the OWTF and one site downstream, in winter 2006. An independent team sampled from the three sites approximately one month later to examine microbial concentrations. Madera County's Engineering Department provided further nutrient and microbial data. Although most parameters measured do not indicate that the OWTF has a significant impact upon the Fresno River at this time, there is a significantly greater amount of algae and other organic material downstream of the OWTF than upstream, indicating an overall downstream increase in the amount of organic matter. Stable isotope data showed an increase, downstream of the OWTF, in $^{15}\text{N}:\text{}^{14}\text{N}$, although the source is likely ammonia. The tributary leading into the river at a site upstream of the OWTF is certainly a point source of Coliform bacteria.

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Poster Session II, Poster Board No. 8

Phenotypic Characterization and Genetic Mapping of Traits in the Pepper Root Rot Pathogen, *PHYTOPHTHORA CAPSICI*

Introduction. Pepper root rot, caused by *Phytophthora capsici* Leon, is a very serious disease of chile and bell peppers (*Capsicum* spp.). Our lab is investigating pepper's ability to resist this disease and the pathogen's ability to cause disease. We have characterized a set of 34 isolates of *P. capsici* for a variety of traits: ability to cause disease on different pepper genotypes, mating type, fungicide sensitivity/resistance, and genetic relatedness based on rRNA ITS gene sequences. We are also constructing a genetic linkage map of the pathogen in order to decipher the locations of its virulence genes.

Methodology. Ability to cause disease was tested by inoculating 11 different pepper genotypes with spores of each of the 34 isolates. Symptoms were screened at 40 days post-inoculation. Mating types of these isolates were determined by crossing them with the two standard A1 and A2 mating types on Petri plates and looking for oospores. Fungicide sensitivity was tested by growing all isolates on varying concentrations of the main fungicide used in the field, metalaxyl. A subset of five agriculturally important isolates was tested against 8 additional fungicides. In all cases, both growth of mycelium and ability to sporulate were tested. Genetic relatedness is being examined by sequencing the products of a PCR designed to amplify the ITS1 region from each *P. capsici* isolate.

Results and Conclusions. The isolates have been grouped into 14 different races based on the results of inoculations on different pepper genotypes. Isolates of both mating types, A1 and A2, were found, with both being found in the same field, indicating the likelihood of sexual recombination taking place. Several different isolates were resistant to various fungicides used to control the disease. PCR of ribosomal ITS is still underway.

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Poster Session II, Poster Board No. 9

The Effects of Urban Development and Climate on Species Distribution in the San Joaquin Valley, California

Global climate change is expected to substantially rearrange the distribution of earth's biodiversity, on global and regional scales. In northern California, mean annual temperatures are projected to rise by 3°C and 5°C by 2050 and 2100 respectively. Simultaneously, human population in the San Joaquin Valley is projected to nearly double by 2050, to 8 million due to urbanization. We investigate rapid urban development and climate as two predictor variables that are expected to influence the distribution of organisms in the San Joaquin Valley. We map the distribution of endemic species, which includes endangered and threatened varieties, within a GIS framework, to address how climate change and urban development will alter the regional distribution of biodiversity. We obtained the geographic ranges of several endemic species and plotted their relative abundance in the Valley. The projected climate and urban development are significant stressors to the current distribution of species. We expect species to either go extinct or to shift their ranges; California plant communities are already predicted to shift their range in response to urbanization and climate change. Further, we analyze the relative effect of urban development and climate change at the local scale; this component of our study may result in policy-level recommendations should one or both variables produce a significant stressor effect on species diversity. Currently, we are investigating change in land use from agricultural to urban as an important variable that will affect future biodiversity. Our results should propel an increased awareness of the rapidly escalating adverse anthropogenic impacts on the unique habitat heterogeneity and species richness of the Valley.

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Poster Session II, Poster Board No. 10

Disease Resistance Genes Cluster in the Genome of Pepper

Introduction: Our laboratory has mapped the chromosomal location of genes in pepper (*Capsicum*) that confer resistance to pepper root rot as well as to two viral diseases and are working on root-knot nematodes and bacterial spot. We have also mapped the location of so-called resistance gene analogs, or RGAs. Disease resistance genes cluster in the genome of pepper. We have also chosen some resistance genes to use in a marker-assisted selection program.

Methodology: All of these genes were mapped using either a set of recombinant inbred lines (RILs) from the cross PI201234 x Psp-11 or a set of F2 progeny from the cross CM334 x NuMex Joe E Parker. AFLPs, SSR, RAPD, RGA, and candidate gene markers were used. Disease resistance was screened by inoculation of plants and susceptible controls. Map positions of resistance genes were determined by using the program MAPMAKER-QTL 3.0. Three strong QTLs conferring resistance to root rot were chosen for marker-assisted selection experiments. Flanking molecular markers will be used throughout a multi-generational breeding program to make sure that they resistance genes stay in the program.

Results and Conclusions: Results are available so far for root rot, chile veinal mottle virus, and potato virus Y resistance, as well as for the RGA locations. So far, at least 6 loci have overlapping resistance genes/RGA locations. In addition, 6 loci confer resistance to multiple isolates of the pepper root rot pathogen. Results are not in, yet, for root-knot nematodes or bacterial spot. Resistance genes are clearly clustering in the pepper genome. Our marker-assisted selection program is at the third generation, now, and will be screened soon using molecular markers to identify appropriate plants for our continued breeding efforts.

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Poster Session II, Poster Board No. 11

**A Comparison of Data Dissemination Protocols for
Large-Scale Wireless Sensor Networks**

Wireless Sensor Network is an emerging technology to combine the advantages of wireless network and low power embedded system. One of the technical challenges in wireless sensor networks is to collect and report data to central station(s). Data dissemination protocol controls the process of collecting and reporting data. In this study, we investigated the effect of data dissemination protocol on the performance of application. Three different grid-based data dissemination protocols are compared using simulation. The first protocol (PROC1) builds grid overlays over the entire network statically at the initial phase. A grid is built for a specific data and is not shared with other data types. The second one (PROC2) build a grid overlay to share among different types of data. The third one (PROC3) builds a grid overlay dynamically on demand.

A network simulation (NS-2) models were built for those protocols and measured three performance metrics including success rate (packet delivery), delay, and power consumption. The performance metrics were measured with two different application scenarios (stationary and mobile station). The simulation results are summarized as follows. The alternatives in grid construction (PROC2 and PROC3) are not effective when fixed measurement station(s) is used. PROC1 improves 15 % of the success rate compared to PROC2 or PROC3. It also improves 15 % of the delay. But, there is not difference in power consumption among those three protocols.

However, grid sharing (PROC2) and on-demand grid construction (PROC3) perform better in the other application scenario, where data collection and logging are performed using mobile station(s) (e.g., car or airplane). The improvements depend on the speed of the mobile station. PROC2 and PROC3 improve 15% to 30 % of the success rate compared to PROC1. PROC2 and PROC3 improve 30 % or more of the power consumption. The improvement increases linearly to over 100% as the speed is increased.

In general, the use of virtual grid overlay in wireless sensor network improves the performance of data dissemination. However, this study results show that the effect of grid construction becomes significant or small depending on application characteristic.

Currently, we are extending the study to other factors affecting network performance and also planning to develop a wireless sensor network for an agriculture application.

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Poster Session II, Poster Board No. 12

Changing Landscapes and Sustainability: Fresno County's Ecological Footprint and the Effects of Urbanization

Urbanization is a dominant trend transforming the natural landscapes of California, adversely affecting biodiversity and ecosystem services. While urbanization has been well studied in large metropolitan areas like the San Francisco Bay region, and Phoenix, Arizona, relatively little is known about its ecological effects in areas such as Fresno County. Located in the Great Central Valley, the heart of California, stretching from the Sierra Nevada to the Coastal Range, Fresno County contains the sixth largest city in California and some of the most fertile agricultural lands in the world. The county's population is currently growing at a rate of 1.9%/year and is estimated to increase by 58% from (821,797 in 2000 to 1,301,204) by 2025. Such an increase in population will require more land for human use and further stress the valley's environment. As expected, rising population has already increased water consumption in Fresno County. In 2000, Fresno County used 6,495 million Kilowatt hours of energy per year, and every resident disposed of a little less than 3 lbs of trash/day. Further, 162,856 tons of carbon was emitted to the atmosphere the previous year. To meet the demands of an increasing population, the Fresno County Office of General Planning allows for new development to occur on 37,737 acres of land, leading to a loss of approximately 2.9% of Fresno County's agricultural land. We investigate the ecological impacts of urbanization on agricultural land in Fresno County and measure the amount of biologically productive land and water used by the county to produce the resources it consumes-its ecological footprint. We also consider the time required for waste to be reabsorbed into the environment using prevailing technology and resource management. Insights from our analyses can help reconcile the expected urban growth with environmental protection.

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Anger Expression within Conduct and Intermittent Explosive Disorders

Conduct disorder and intermittent explosive disorder are categories in the DSM-IV describing people with aggressive behavior problems. Differential diagnosis of these disorders is important for designing appropriate treatment strategies. It is hypothesized that participants with conduct disorder will score higher on measures of anger control and anger in, while participants with intermittent explosive disorder will score higher on measures of anger out. 197 participants, 24 meeting criteria for conduct disorder, 47 meeting criteria for intermittent explosive disorder, and 11 of these same participants meeting criteria for both, were recruited from a student counseling center. They each completed the State Trait Anger Expression Inventory and anger interviews, consisting of 3 situations involving anger provocations by family members. Anger interview responses were coded by 10 raters on 18 dimensions of anger expression. Each rater was individually trained and practiced coding each situation, before rating the actual participants. In this study conduct disorder is operationally defined as meeting criteria for both the Entitlement and Poor Self Control schemas on the Young Schema Questionnaire, while intermittent explosive disorder is operationally defined as a BSI hostility scale score greater than or equal to 60. Results indicate that people with conduct disorder scored higher on measures of anger out and anger in, while people with intermittent explosive disorder generally scored higher on measures of anger out but lower on measures of anger control-out, when compared to those who did not have either disorder. No interactions existed between conduct and intermittent explosive disorders for anger expression variables. The study discusses implications for formulating appropriate treatments, for both conduct and intermittent explosive disorders.

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Protein Profile of Transgenic *Nicotiana tabacum* Plants Expressing *Caenorhabditis elegans*' Cell Death Genes

Background: The development of transgenic crops has had an enormous impact in agriculture with benefits to both the consumer as well as the producer. However in the rush to get these items on the market we have failed to investigate what global effects transgenes have on the crop's endogenous protein profile. Here we will attempt to analyze what effects *Caenorhabditis elegans*' cell death genes; Ced4 and Ced3, have on transgenic tobacco's (*Nicotiana tabacum*) protein profile to better understand the mechanism by which they acquire resistance to parasitic nematodes. Although microarray studies indicate an up-regulation of pathogenicity related genes in response to the expression of *C. elegans* cell death genes, it remains to be determined if these genes are in fact being translated into proteins. We hypothesized that the expression of *C. elegans* cell death genes Ced3 and Ced4 induce the expression of plant pathogenicity related genes that also being translated into protein.

Methods: Image analysis of 2-D protein gels will be used to identify if pathogenicity related proteins are differentially expressed in transgenic tobacco plants when compared to their wild-type counterparts. Up-regulated protein spots will then be excised and analyzed by mass spectrometry to identify each protein that is differentially expressed.

Results: Protein extractions from transgenic tobacco plants suggest 2-D gel electrophoresis may be used to identify which proteins are being differentially expressed. However, we are currently attempting to optimize protein visualization using various detection protocols.**Conclusion:** These proteomic studies will establish protein expression profiles for Ced-3, Ced-4, Ced-3XCed-4 transgenic and wild-type tobacco plants to gain a better understanding of how.

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Poster Session II, Poster Board No. 15

An Investigation of Quinones as Biomarkers for Exposure to Air Pollution

Particulate matter (PM) is a component of air pollution that has been linked to health problems such as asthma. Quinones are chemical species found within PM that are suspected of initiating chemical reactions that may lead to asthma attacks. Previous work has shown that levels of quinones are high in Fresno, and that peak levels occur when incidences of asthma attacks are at their maximum. To investigate the link between air pollutants and health effects on an individual, it is necessary to know the quantities of a pollutant that the individual has been exposed to. One approach to obtain this information is to monitor the levels of the pollutants or their metabolites in the urine or blood of the subject. This provides a convenient and relatively inexpensive method to monitor exposure if the levels of these biomarkers are correlated with the amount of pollutant inhaled.

The goal of this work is to evaluate the use of quinones as biomarkers for exposure to these pollutants and PM. Urine samples were collected from Sprague-Dawley rats 24 hours after exposure to 9, 10-phenanthraquinone (PQ). Additional samples were collected from human subjects during Summer 2006 and Spring 2007. Quinones were extracted from the samples and analyzed by gas chromatography/mass spectrometry.

Urinary levels of PQ in the rats were found to be correlated with the levels that the animals were exposed to. Levels within all exposed animals were significantly higher than in unexposed animals. The seven monitored quinones in human samples were below the detection limits during the summer, but were observable in samples collected during Spring, when ambient quinone levels are known to be higher. This study demonstrates that quinone biomarkers may be a useful method to track exposure to pollutants such as quinones and PM.

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Differential Aggressive Responses to Male and Female Provoking Situations

In contrast to other manifestations of anger, driving anger seems to be an increasingly more frequent and more socially acceptable outlet of expressing negative emotion. In a survey conducted on U.K. motorists, nearly 90% reported that they had been victims of what they perceived to be road rage. In addition, approximately 60% stated that they themselves had experienced anger while driving over the past year (Joint, 1996).

Very few studies have examined differences between males and females on “road rage” behavior. Social role theory (e.g., Eagly, 1987) suggests that men and women behave differently within social situations. Although driving situations are not explicitly social in nature and drivers often do not interact directly with one another, it is likely that anger within these situations reflects a perceived interaction between drivers. Research has shown (Nesbit, 2004) that different anger expression styles (measured by the Anger Expression scale on the State-Trait Anger Expression Scale; Spielberger, 1988) predict negative driving outcomes for men and women. It is not yet known if individuals react differently to male and female instigating drivers. The purpose of this study was to assess differences in participant’s self-reported cognitive, behavioral, and emotional reactions to male and female provoking drivers within realistic driving situations. Fifty female participants viewed three videotaped simulated driving situations (a neutral situation and two anger-provoking situations), and were told to focus on their reactions within each situation. These simulated situations were created with both male and female confederate drivers, and descriptions of the situations presented to participants can be manipulated to denote the gender of the confederate driver. Immediately after each presented situation, participants rated their anger levels and the likelihood of engaging in certain aggressive and non-aggressive behaviors. Although analyses are still in progress, female participants were expected to report increased angry and aggressive responses to the provoking female drivers, when compared to the male provoking drivers. Implications of this study will be discussed in terms of intrasexual selection theories of competition and jealousy.

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Community Partners in Research: The Tib Trainer

The Physical Therapy Department was asked to study the Tib Trainer for its creator. This research sought to demonstrate the efficacy of the Tib Trainer exercise equipment when used with persons age 60+y.o.

Methods: A sample of convenience was drawn from volunteers 60+y.o. attending an on campus exercise class: N=8. Participants continued in the exercise class and added the research activity. Pre/Post-test Limits of Stability (LOS) testing on a computer assisted force plate were used to illustrate the efficacy of the Tib Trainer protocol. LOS tests are used to reliably assess fall risk.

Results: All the participants in the study had significant ($p=.05$) LOS gains using the Tib Trainer protocol. Although participants had significant improvements in their LOS, these results were not maintained when LOS was tested one year later.

Conclusions: Participants in the study reported they found the tib trainer protocol fun, challenging, and confidence building. More research is needed to determine: 1-what training interval is required to maintain the gains demonstrated in this study or 2-what functional activities participants need to perform regularly to maintain the gains demonstrated in this study.

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Selenium Impact on Frog Corticosterone Level and Development

The influence of environmental toxins, such as selenium, on stress and development in amphibians has not been extensively studied. High selenium concentrations have detrimental effects on frogs by increasing corticosterone levels, which cause muscle atrophy, increased metabolic rate, reduced fecundity and immunosuppression. These phenomena are considered to be stress related. I hypothesize that selenium accumulation and corticosterone level will increase with increasing selenium levels and possibly cause stress, which impacts survival.

To assess the potential detrimental effects of selenium inducing stress in frogs, a laboratory study (using *Rana pipiens*) and a field survey (sampling *Rana catesbeiana*) were conducted. *Rana pipiens* raised in tanks were exposed to selenium levels (0 ppb, 1 ppb, 5 ppb and 13 ppb) found in ponds and the larvae food was laden with selenium (0 ppb, 1 ppb, 5 ppb and 13 ppb). We quantified selenium accumulation, hatching success, development and corticosterone levels, to assess the possible impact that stress from selenium is having on laboratory *R. pipiens*. Corticosterone levels were obtained from *R. catesbeiana*'s, which were found at a pond with selenium (~13 ppb) exceeding U. S. EPA's freshwater chronic criterion (5 ppb), blood as an indicator of possible selenium induced stress. *Rana catesbeiana* liver selenium concentrations (36 to 56 ug/g; mean = 45.25 ug/g) from this pond were similar to other selenium contaminated sites (Kesterson Reservoir: 25 to 88 ug/g; mean = 45 ug/g), known for high deformities and mortality in nesting birds. From the same pond, environmental samples (water, sediment, vegetation, and insects) were recorded quarterly to assess the bioaccumulation of selenium.

We are in the process of completing the second laboratory trial and will be analyzing the data (selenium and corticosterone levels) for field samples and laboratory *R. pipiens*. Our preliminary results indicate a significant difference ($P < 0.05$) among selenium treatments for the laboratory study and selenium was found bio-accumulating in the food chain for the field study.

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How Spatial is Social Distance?

The construct of social distance has been studied extensively since the early 1900's (e.g., Bogardus, 1933). However, studies examining the existence of absolute social distance have been scarce. Do people think about social groups in terms of space? Does spatial thinking influence the conceptualization of concepts pertaining to gender, race, SES, or national origin? Results of the current study suggest that an underlying spatial framework may influence socially relevant information.

In the current study 335 UC Merced students were given narratives that differed with regard to embedded characters' national origin. After these participants read the narrative, they drew figures representing the characters in a natural scene. Drawings were coded by view type (bird's eye, semi bird's eye, eye level), respective figure placement (horizontal, vertical, and diagonal), average figure height (mm), and inter-figure distance (mm) to get at participants' spatial representation of social information.

Differences by narrative condition were not found for figure placement nor average figure height. Inter-figure distance approached significance ($p=.058$), participants who believed that two characters shared a common national origin drew representative figures further from one another ($M=88.69$ mm, $SD=38.64$ mm) than participants who believed the individuals came from different national origins ($M=77.05$ mm, $SD=34.96$ mm). Participants who were given national origin-absent information drew figures with inter-figure distance residing between the two experimental conditions ($M=84.57$ mm, $SD=40.91$ mm). Results are discussed with regard to out-group homogeneity and social distance theory.

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Poster Session II, Poster Board No. 20

Case Study: Schwannomatosis with Involvement of Multiple Nerves

We present a case of a 54-year-old Chinese woman in the Department of Orthopedics Surgery in Tseung Kwan O Hospital, Hong Kong for evaluation and treatment of recurrent schwannomatosis with involvement of multiple nerves.

Briefly, the patient first presented to our clinic with left forefoot pain in 2005. MRI of spine and lower limb revealed multiple nerve sheath tumors of the extremity with involvement of the sciatic nerve. The patient underwent excision of left forefoot tumor. Histology of the tumors were confirmed to be schwannomatosis.

5 months after the first operation, patient presented with a 2-cm, soft but painful lump near the previous surgical site. Patient underwent a second operation for excision of the left posterior tibial nerve.

Postoperatively, patient complained of paraesthesia on 3 left fingers. She also had partial weakness in the intrinsic muscles of her left hand. Physical exam showed diminished left knee jerk and numbness. MRI showed multiple nerve sheath tumors arising from the left arm involving the brachial plexus, the clavicle and the supraclavicular plexus. There was also tumor extension into the spinal cord in her lower back. She underwent excision of tumors from her arm and lower back surgery (L3,4 laminectomy and excision of the intradural L4 tumor). Histology confirmed schwannoma. Follow up MRI at 6 months did not reveal any residual disease.

This case is unusual in that schwannomas are tumors of peripheral nerves and multiple schwannomas of the peripheral and central nervous system are uncommon. In our case, the patient presented with painful paraesthesia in the dermatome distribution. Notably, pain is the most common presentation of schwannomas.

Debate is ongoing to determine whether schwannomatosis is a distinct entity from Neurofibromatosis-2 based on genetic, radiologic and histologic findings. The case highlights the importance of enucleation of the tumor without damaging the nerve.

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Incorporating GPS-GIS Technology in Student Learning to Enhance

The use of Global Positioning System (GPS) and Geographic Information System (GIS) technology has become an integral part of the decision-making process in the practice of Environmental Health (EH) at all levels of government. Cutting edge application of this technology is extensively conducted in EH programs at the state and county levels in California, most notably in our area in Tulare and Madera Counties. Because of this, the Central Valley Directors of Environmental Health have informed the Environmental/Occupational Health & Safety (EOHS) Option in the Health Science Department at Fresno State of the need for incorporating discussion and use of GPS-GIS technology into the option's curriculum. In addition, the accrediting bodies for EH academic programs are strongly encouraging the development and inclusion of GPS-GIS technology in the standard programmatic curriculum of their accredited programs.

A 7 month (September, 2006, through March, 2007) project was developed to implement competency based education by developing curriculum and conducting activities in technology enhanced student learning. The project involved the integration of GPS-GIS technology into an existing environmental health course. Students learned about taking GPS readings in conjunction with collecting water samples for laboratory analysis along the San Joaquin River. Students then use the GIS shape files and maps developed from their sampling results to draw conclusions on the findings.

The ultimate goal of the project was to provide students with the knowledge and skills to use GIS mapping as a tool in decision-making. Project outcomes from this seven-month project included: 1) delivery of a learning session in a prerequisite course that provides an overview on the uses and benefits of GPS-GIS technology in decision-making; 2) development and implementation of a learning module on GPS; and 3) development and implementation of a learning module on GIS.

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Quantitative Analysis of the Effects of Ionizing Radiation on *Arabidopsis thaliana*

Few studies have examined the impact of radiation on physiologically active plants and subsequent impact on growth, rates of photosynthesis and respiration, and chlorophyll content. The principle objective of the study is to assess whether plants can be used as biological dosimeters to measure the amount of radiation dose after accidental radiation exposures or leaks to the environment. *Arabidopsis thaliana* was chosen due to its frequent use as a model in the plant sciences. This work is a continuation and expansion of a research project undertaken in 2004/2005.

Grown in controlled environment chambers with 12 hour day/20 oC/75% humidity, the plants were divided into three growth stages and will be irradiated with a linear accelerator. The effect of radiation depends on the amount of energy and the type of radiation that is delivered to the tissue. The irradiation doses are delivered as either a single dose or dual fractionated doses with the same total radiation dose. The total irradiation doses will be delivered at four levels, 0.5, 4, 50, and 150 Gy. Pre-harvest measurements include photosynthetic and respiration rates, internode length at first flower and chlorophyll concentration and chlorophyll a/b ratio. Post-harvest measurements will consist of plant height, number of leaves, and number of flowers, leaf area and total plant biomass.

This research has the potential to define whether the plants have the capability of serving as biological dosimeters as well as whether their response at different growth stages can illustrate the role of DNA repair mechanisms at different doses and different rates of dose.

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Characterization of Mycobacterium Smegmatis 137E6 Transposon Mutant

Mycobacterium smegmatis is a non-pathogenic bacterium that has gained the attention of many scientists due to its evolutionary relationship to the pathogen *M. tuberculosis*. Consequently, *M. smegmatis* has become the model organism to investigate the biochemistry and physiology of *M. tuberculosis*. A *M. smegmatis* mutant library, from which fourteen mutants were selected to be characterized, has been generated using EZ-Tn5[®] transposon mutagenesis. The mutants' genomic DNA was extracted and digested separately with *Apa*I, *Sph*I, *Kpn*I, *Bam*HI, and *Sal*I. The fragments generated were then self-ligated and prepared for PCR using outward primers complementary to the ends of the transposon. The primers are designed to amplify the flanking regions of the gene disrupted. The amplified regions were independently cloned into plasmid vector pCR2.1-TOPO[®] followed by transformation into *E. coli* DH5[®] competent cells. Subsequently, the plasmids were isolated, purified and sequenced. The sequences were subjected to BLAST analysis against the *M. smegmatis* genome and the disrupted genes were identified. Only the 137E6 mutant was of significance since the transposon seems to interrupt the intergenic region between MSMEG_0663, and MSMEG_0664. The MSMEG_0663 gene belongs to the TetR-family of transcriptional regulators. Tetracycline repressor (TetR) functions as a potent transcription factor to regulate gene expression. The MSMEG_0664 gene belongs to the FAD dependent oxidoreductase family, which is associated with the catalysis of oxidation-reduction reactions. To further characterize the function of the mutated genes, the mutant phenotype will be determined by growth assays under different stress conditions. Thereafter, the native genes will be reintroduced in the mutant to further confirm the functions of the genes.

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Identification and Characterization of Two Diamide Sensitive *M. smegmatis* Transposon Mutants

In 2005, 8.8 million people were infected with *Mycobacterium tuberculosis* (Mtb), the main bacterium responsible for causing Tuberculosis (Tb). The emergence of multi-drug resistant Mtb strains generates further concern. Mtb is a slow growing, pathogenic organism making it difficult to study; whereas, *Mycobacterium smegmatis*, the model organism for studying mycobacteria, is fast growing and nonpathogenic. A mutant library of *M. smegmatis*, created by transposon mutagenesis, was screened for sensitivity to diamide. Diamide, a thiol-specific oxidizing agent acts to cause oxidative stress. Random diamide sensitive mutants from the library were selected in order to identify the genes disrupted by the transposon. Genomic DNA was extracted and digested with various restriction enzymes that either cut at one end of the transposon or probable sites within *M. smegmatis* genes. The digested fragments were self-ligated and PCR-amplified with outward primers complementary to the ends of the transposon. In this manner, the primers amplified the flanking regions to the transposon. The PCR products were cloned into pCR2.1 and then transformed into competent *E. coli*. Plasmid DNA was extracted and sequenced. The disrupted genes in mutants 16F12 and 76F8 were identified as a multiphosphoryl transfer protein and polyphosphate (poly(P)) glucokinase, respectively. Poly(P) glucokinase catalyzes the phosphorylation of glucose using poly(P)s or ATP as the phosphoryl donor. Multiphosphoryl transfer protein is a part of a complex system involved in carbohydrate active transport especially fructose. We plan to characterize by performing growth assays in different growth mediums and subjecting them to various stress agents that mimic environmental stress. Then we plan to complement the mutants by introducing the functional copy of the genes.

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Characterization of Mycobacterium Smegmatis Mutant 109C4

Mycobacterium smegmatis is a close relative of *Mycobacterium tuberculosis*, which is the cause of 1.6 million deaths annually. Study of *M. smegmatis* may lead to new treatments effective against *M. tuberculosis*. As part of our graduate level nucleic acid technology class, we examined a transposon mutant of *M. smegmatis*, mutant strain 109C4. This mutant strain contains an insertion of the Tn5 transposon in its genome. To determine the location of the insertion we digested the genomic DNA with Sal I restriction endonuclease and ligated the digest into circular DNA. We then PCR-amplified the DNA neighboring the transposon using outward facing KAN-2 primers. Following amplification we cloned the amplified DNA into a PCR 2.1 plasmid in *E. coli*, then isolated the plasmid, and sequenced the cloned fragment. Using a BLAST search we determined that the sequenced fragment contained a section of the 813 base pair MSMEG 6704 that codes for a shikimate 5-dehydrogenase, indicating that the transposon is inserted within this gene. This enzyme is part of the shikimate pathway for synthesizing aromatic compounds, including aromatic amino acids, and this pathway is essential for the survival of bacteria, fungi and plants. *M. smegmatis* contains two other shikimate 5-dehydrogenase genes, MSMEG 3028 and MSMEG 5457, which may compensate for the mutation. Further work will be done characterizing the mutant and its growth in minimal media versus media supplemented with aromatic amino acids.

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**Short-Chain Dehydrogenase-Reductase Gene Interrupted in Diamide Sensitive
Mycobacterium I Transposon Mutant**

Mycobacterium genus encompasses saprophytic, opportunistic and pathogenic species that are responsible for human threats such as leprosy, tuberculosis and Buruli ulcer leading to millions of deaths around the world every year (Soden, 2005). Mycobacterium smegmatis however, is non pathogenic and can easily be studied in the laboratory. In this study, the disrupted gene in the transposon mutants 22D10 and 133H8 which were previously screened for diamide sensitivity, was identified. Genomic DNA was digested with BamHI and Sall, respectively, self ligated and amplified by PCR with outward primers complementary to the sequence at the ends of the transposon. Bands of approximately 600 bp were amplified, extracted, ligated to pCR2.1 TOPO cloning vector and transformed into E. coli DH5 á competent cells. Cloning of the correct fragment was confirmed by restriction analysis with EcoR1. Plasmid DNA was then extracted and sent for sequencing. TIGR BLAST analysis of 22D10 identified the disrupted an operon containing genes MSMEG_3371 and MSMEG_3372. MSMEG_3371 encodes a short-chain dehydrogenase-reductase (SDR), and is involved in oxidoreductase activity (www.tigr.com). SDR displays a wide substrate spectrum, ranging from steroids, alcohols, sugars, and aromatic compounds to xenobiotics (Kallberg, 2002). MSMEG_3372 encodes arsR, a transcriptional repressor gene, which controls membrane efflux pump expression in Staphylococcus aureus (Ji, 1992). TIGR BLAST analysis of 133H8 identified a disruption in a hypothetical protein (www.tigr.org). Further research on 22D10 and 133H8 will include characterization of the mutants under different growth conditions with reference to the wild-type M. smegmatis phenotype. We will also reintroduce the wild-type gene into the mutants, confirming mutant phenotype was due to disruption of the genes we identified.