

The Graduate Student Assembly



Proudly Presents:

The 22nd Annual Research Symposium and Exposition

**Wednesday, March 29, 2006
Multipurpose Room, Graduate Life Center**

Sponsors:

- 1. Office of the Provost**
- 2. College of Liberal Arts and Human Sciences**
- 3. College of Natural Resources**
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Preface & Acknowledgements

The Research Symposium and Exposition of Virginia Tech is a forum that provides graduate and undergraduate students a unique opportunity to showcase their scholarly pursuits and achievements in their respective academic fields. The symposium is intended to stimulate interaction and exchange of ideas among faculty, staff and students from a variety of disciplines and backgrounds.

This year's Symposium has three entry formats that allow all students of Virginia Tech to present in the medium that is appropriate for their work. The three entry formats are:

- Poster Presentation
- Visual Presentation
- Lecture, Speech or Performance Presentation

Participants were able to choose from seven entry categories for the 2006 Research Symposium:

- Advanced Undergraduate
- Agriculture and Animal Sciences
- Arts, Architecture and Urban Studies
- Engineering
- Natural and Biological Sciences
- Physical Sciences
- Social Sciences and Humanities

I would like to congratulate all of the participants for their outstanding accomplishments and willingness to share their work with the Virginia Tech community. All of the research presented is truly impressive and serves as a testimony to the high caliber of academic and research programs at Virginia Tech.

There are many people to thank for their efforts and hard work in organizing and running this event. I especially want to thank our 28 judges. A record number of one-hundred thirty-seven entries were received this year and without such a generous show of support from our faculty judging this number of entries would have been a monumental task. Likewise, a successful fund raising campaign allowed for three cash prizes in each of the seven entry categories. We would like to thank the Provost Office for their support for the fifth year in a row. We would also like to thank our other sponsors: College of Liberal Arts and Human Sciences, College of Natural Resources, College of Science, College of Agriculture and Life Science and Virginia-Maryland Regional College of Veterinary Medicine. Without the support of our sponsors we would not be able to put on such a high-caliber event.

I would also like to thank Roberto Mayorga and Monika Gibson of the Graduate School whose patience and support were invaluable to making this event a success. I also acknowledge help from Graduate Student Assembly Executive Board: Jamie Kalista, Linsey Barker, Swamy Siddaramappa, Jory Ruscio, and LaChelle Waller. Finally I would like to thank Paula Williams for keeping me on track all semester! Thank you to everyone who helped make this year's symposium a success..

It has been a pleasure to serve as a chairperson of this year's Research Symposium

Laura Freeman
Chair, 22nd Annual Research Symposium and Exposition of Virginia Tech

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** In abstracts indicates Symposium Participant*

22nd Annual Research Symposium Schedule

7:00 AM Early Setup

8:00 AM Breakfast Served

10:00 AM Symposium/Judging Begins

12:30 PM Lunch Served

4:00 PM Symposium/Judging Ends

Lecture Presentation Schedule

Time	Participant
10:00	Ashley Shew
10:10	Asli Sahin
10:40	Mohannad G.AL-Saghir
10:50	Jose M Rullan
11:00	Jared Peatman
11:10	Matthew Krogh
11:20	Leonard Lanier
11:30	Kamau Rucker
11:40	Joshua Sweeney
11:50	Seung-Hui cho
12:00	Julia Best
12:40	Sarah DuRant
1:00	Tugrul Keskin
1:10	Marissa Duff
1:50	Manisha Singal
2:00	Jiyun Wu
2:10	Virginia Rothwell
2:20	Kyuhoo Lee
2:30	Michael Ferranti
2:40	Ana R. Constantinescu

Advanced Undergraduate

#1 Nutritional and Economic Impacts of a Pasture Based Beef System

Morgan Lindsay Allen, Scott Sink
Agriculture and Applied Economics*

Farmers in the beef industry primarily have small beef operations, less than 50 cows thus, limiting net returns. Small scale beef producers are not cost competitive with large more efficient feed lot production systems. By developing forage systems that seek to match seasonal forage supply to animal demand, farmers can increase economic benefits. Through these systems, producers can control many aspects of forage and pasture management to develop an efficient pasture-based beef production system. The success of a forage-based beef system will depend primarily on product quality, market acceptance, and the willingness of consumers to pay premium prices for the product. This research project will look at the economic feasibility of farmers optimizing the nutrients of their forage systems to produce pasture-based beef to market to consumers in niche markets.

#2 Structural Evolution of the Sauratown Mountain Quartzite, Evidence for Polyphase Deformation and Shearing.

Paul Michael Betka, Micah J. Jessup, Rick D. Law
Geosciences*

Sauratown quartzites represent a continental margin sedimentary package that was deposited on top of Mesoproterozoic (1.2Ga) schist and gneisses and then transported westward as part of the Blue Ridge-Piedmont thrust sheet. Relationships between overprinting, crenulation cleavage, and stretching lineations record three phases of deformation (D1-D3). Isoclinal recumbent folds (F1) trend east-west and are the earliest generation of folding. F1 folds are overprinted during D2 by southeast vergent, shallowly plunging open F2 folds. Stretching lineations are prevalent throughout the outcrop and are sub-parallel to the orogen. Previous work suggests that these stretching lineations (L1 and L2) were generated during D1 and D2 and then rotated to their current orogen parallel orientations by later warping of the anticlinorium. However, it is possible that these stretching lineations were rotated to their current orientations by oblique convergence or shearing. Stretching lineations common in highly strained quartz veins are sub-parallel to the prominent lineation throughout the outcrop indicating that crystal plastic processes accommodated some deformation during D3. These lineations (L3) record NE-SW extension when L1 and L2 were rotated into parallelism with L3. Together this evidence suggests that two phases of deformation in the Sauratown quartzites culminated in final phase of orogen-parallel extension.

#3 Career Interest in Agriculture of the 2004 Class of the Virginia Governor's School for Agriculture

Catherine Byers, Ryan G. Anderson, John Cannon
Agricultural and Extension Education*

The Virginia Summer Governor's School for Agriculture (VGSA) has been developed as an agricultural literacy tool by the Virginia Department of Education, Virginia Farm Bureau, Virginia Agri-Business Council, and Virginia Tech College of Agriculture and Life Sciences. The purpose of this study was to determine the impact of the VGSA and demographics on the career interests in agriculture held by students of the 2004 school. The mission of the school is to provide hands-on, cutting-edge scientific and academic instruction to future leaders and scientists to develop their understanding of the scope, opportunities, challenges, and both academic and scientific rigor of the broad fields of agriculture and natural resources. Each student who attends VGSA is required to select a "major". The majors include agricultural economics, animal science, food science and nutrition, natural resources, plant science, and veterinary medicine. All students take a core course in each of the majors. Students in a chosen major will receive one in-major course, and each student will have two elective courses. The purpose of this study was to determine the impact of the VGSA and demographics on the career interests in agriculture held by students of the 2004 school.

#4 Spear me down, Heaven

*Seung-Hui Cho**

English

This thing, my life, all an agony, of Hell of torture... And years of bludgeoning torment, tiny nuisances. The disgust eyes, dirty frowns, and red fingers pointing at me. Feeling all the patheticness and humiliation. What time is right to abort the null existence and retire from sick lifeblood. And yet feelings—thwarted by sun's beams ready to attack, averted by smiling faces ready to rape— come, a wish to annihilate my self... If this wasn't true in my plaguing conscious. But Jesus Christ! Another day comes tomorrow, a shade better than present, if I can imagine, a day anew like a new born or an old dying, when nothing is everything and everything is nothing and all is mere shutting of eyelids. Good Christ! Rip me apart, tear me to shivers, eat me to help me see a better day's worth and salvage this decaying thing from myself.

#5 MemberMe: Assistive Device for Mentally Disabled Employees

Amanda L. Cowley, KaYing Li*

Industrial Design

Employees with a mental disability are unable to advance in the workplace because they take more time to accumulate and retain knowledge than other employees. This handicap, which requires special attention and communication, creates a social disconnect in the workplace environment. Disabled employees work primarily in places that require a repetitive step-by-step process. In order to reinforce skills needed in today's job market, MemberMe is a portable, rechargeable digital device that trains workers through visual demonstrations of the tasks. MemberMe bridges the communication barrier between employee and supervisor by a two-way communication option. Portability improves productivity by eliminating the need for constant supervision. The device provides independence through control of functionality, with the security of knowing that help is within reach. Through personal responsibility and problem solving, MemberMe also teaches self dependence. MemberMe is a concept, developed in a two month time period as a contest submission to the NISH organization. NISH is a nonprofit agency focused on getting work for the severely disabled. The entry was turned in on January 30, 2006.

#6 Aging, Physical Activity and Resting Metabolic Rate

Elizabeth Dennis, Emily Van Walleghen, Brenda Davy*

Human Nutrition Foods and Exercise

It is commonly thought that resting metabolic rate (RMR) declines with aging. This decline has been attributed to physical inactivity and reductions in fat-free mass (FFM). Whether physically active older adults demonstrate reductions in RMR comparable to sedentary older adults is unclear. Therefore, the purpose of this study was to determine the influence of age and physical activity on RMR. Participants were healthy, nonobese, young (21-35 yrs) and older (60-78 yrs) males and females. Body composition was determined using dual energy x-ray absorptiometry (DEXA); RMR was measured using indirect calorimetry. Physical activity level was determined by reported weekly minutes of moderate to vigorous physical activity. After adjusting for FFM, RMR was significantly lower in older versus young adults (1369+26 vs 1449+22 kcals, $p=0.03$). However, no significant difference in RMR was detected in sedentary versus active older adults (1342+38 vs. 1337+32 kcals, $p=0.92$). Our results suggest that RMR is reduced in older as compared to younger adults, and that this reduction is not influenced by physical activity habits. Hence, factors other than physical inactivity and reductions in FFM contribute to the age-related decline in RMR.

#7 Stroubles Creek Watershed Initiative

Marissa Duff, Tamim Younos, Katie Perkins, John Burke, Kelly Davis*
Biological Systems Engineering

Virginia Tech Duck Pond is fed through two branches of the Stroubles Creek (Central and Webb). Overall goal of the study is to characterize seasonal pollutant input to the Duck Pond and the effect of the Duck Pond on water quality exiting the Duck Pond. Specific objectives of the study are to identify the levels of E. coli, reactive phosphorus, nitrate, pH, temperature, and total filterable solids in the branches of Stroubles Creek that enter and exit the Virginia Tech Duck Pond. A set of nine samples were taken as a baseline reading. The sampling sites included the Central and Webb branch entrances and the Main branch exit. Each sample was analyzed for E.coli, reactive phosphorus, nitrate, pH, and total suspended solids. Although no concrete conclusions can be drawn at this time, our data indicated that the water contains more E.coli, orthophosphates, and nitrate levels as it enters the Duck Pond and a significant amount less, as it exits. In the future we will collect samples in these same locations and monitor the E.coli and nutrient levels found in the Duck Pond, comparing them to this baseline reading. The study is a component of the Stroubles Creek Watershed Initiative supported through Virginia Water Resources Research Center.

#8 Understanding the effects of myo-Inositol Oxygenase on signaling pathways

Nicole Fontaine, Shannon Alford, Glenda Gillaspay*
Biochemistry

Myo-inositol is used as the backbone of inositol phosphate and phosphatidylinositol phosphate signaling molecules. The enzyme Myo-Inositol Oxygenase (MIOX) catalyzes the oxidation of myo-inositol to D-glucuronic acid, which is further altered to produce Vitamin C. MIOX is part of a four member gene family. MIOX could act as a central regulator in balancing the cell's needs for myo-inositol since it catalyzes the first step of myo-inositol catabolism. We are interested in whether MIOX4+ plants contain alterations in inositol signaling. Our research has suggested that MIOX4+ plants are compromised in their ability to produce the second messenger Ins(1,4,5)P₃, which is involved in stress response. We tested the effects of stressing the plants with salt. We found that there was no change in sensitivity between wildtype plants and MIOX4+ plants during germination, in four-day-old seedlings or in mature plants. This result suggests that the plant may be compensating for MIOX overexpression. In addition to MIOX overexpressors, we are also interested in plants that have a loss of gene function. Currently, six different lines have been isolated that have a loss of function for one of the four MIOX genes. Our results will help us understand how MIOX function affects signaling.

#9 Influence of Age, Gender and Physical Activity Habits on Eating Behaviors in Nonobese Adults

Kelsey Gilmour, Emily Van Walleghen, Elizabeth Kealey, Sandra VonKaenel, Dan Bessesen, Susan Johnson, Brenda Davy*
Human Nutrition, Foods and Exercise

Eating behaviors such as dietary cognitive restraint (CR), perceived hunger, and disinhibition are associated with obesity and body weight disorders. There has been little work examining relations of these factors with age, gender, body mass index (BMI), and lifestyle habits among non-obese adults. Therefore our purpose was to investigate associations between these variables. Methods: Healthy men (n=38) and women (n=41) completed eating behavior questionnaires and reported habitual food intake and physical activity habits. Results: Age was significantly correlated ($p < 0.05$) with CR ($r = 0.28$) and hunger ($r = -0.44$); females reported more CR and disinhibition than males. BMI was associated with CR ($r = 0.25$) and disinhibition ($r = 0.22$), but CR was negatively correlated with caloric intake ($r = -0.326$) and percentage of calories from fat ($r = -0.361$). No significant associations between eating behaviors and physical activity habits were noted. Conclusions: We found more dietary restraint among older adults, females, and individuals with a higher BMI, but less restraint among those reporting a higher calorie and fat intake. This suggests that a higher BMI may not be due to lack of restraint but to disordered eating related to disinhibition.

#10 Psychologically-Based Interventions on Suicide: A Meta-Analysis

Christina L. Goodwin, Goerge A. Clum Ph.D.
Psychology*

This meta-analysis evaluated forty studies of treatments for suicidal behavior. Six different treatment approaches were compared for change on target (e.g., suicide attempts), associated (e.g., depression), and process (e.g., problem-solving skills) variables using Cohen's *d*. Dialectical Behavior Therapy (DBT) was most effective overall for target and associated variables ($D=0.52$), and problem solving was most effective for process variables ($D=1.04$).

#11 Visual Vector Sensor

Laura Jones, Sarah Hefter, Stephanie Goellner
Aerospace Engineering*

The Visual Vector Sensor project is being conducted in Virginia Tech's Space Systems Simulation Lab (SSSL). This attitude determination and controls laboratory houses two spacecraft simulators – Whorl-I and II – which rest on air bearings to simulate a frictionless environment. These simulators are being developed to eventually provide full closed-loop feedback systems that will establish and control each simulator's attitude. The simulators thus require instrumentation with the capacity to make measurements that indicate the orientation of the simulator relative to its environment.

The Visual Vector Sensor project aims to develop a typical web-cam into an attitude determination device on Whorl-I. Whorl-I consists of a tabletop platform with full freedom in yaw and +/- 5 degrees of tilt in pitch and roll. A triangle will be placed directly above the center of the yaw rotation, enabling the camera to capture images that will reveal the simulator's orientation. The research goals of this project include developing a successful image processing algorithm, writing code that will identify the vertices and centroid of this triangle, and developing the code that will convert this information into a useful set of angles that will define the attitude of the simulator at the time the image was taken.

#12 Trypan blue staining of mips1-2 mutant in Arabidopsis

Rachel Kerwin, Glenda Gillaspay, Javad Torabinejad
Biochemistry*

Three myo-inositol phosphate synthase (MIPS) genes control inositol production in Arabidopsis. MIPS catalyzes the isomerization of Glucose-6-P to inositol-1-phosphate. A knockout of the MIPS1 gene (mips1-2) has been identified that contains a lower level of myo-inositol. Presence of physical lesions on cotyledons and young leaves characterizes this mutant. Tissues from mips1-2 can be stained with trypan blue and viewed under a microscope to show blue patches corresponding to dead cells. In contrast, no staining is observed in the tissues of WT plants. Prior to the formation of obvious lesions, staining of the mips1-2 tissues identifies some cell death. This is followed by a further tissue damage leading to the noticeable lesions. These observations are compatible with the results obtained from Genevestigator showing that MIPS1 is more important in early Arabidopsis seedling growth. It is not until the plant is older when the other two MIPS genes (MIPS2 and MIPS3) become important in the inositol synthesis pathway. It is therefore concluded that a decreased inositol production in mips1-2 correlates with an increased level of cell death and lesion formation.

#13 Children's Decisions About Helping Others

*Lindsay Lai**, *Missy Sirola**, *Sheena Horsford*
Psychology

Recent literature suggests that children who are able to identify and express emotions may display better social skills and show better coping with stressful social situations (Eisenberg, Cumberland, & Spinrad, 1998). These emotional skills are also closely tied to children's empathy and altruism, or prosocial behavior (Hoffman, 2000). It is important to study children's emotional skills and prosocial behavior because children who are more prosocial tend not to become bullies or engage in other antisocial behavior (Bandura et al., 2003; Ollendick, 1996). In this study, we conducted naturalistic observations of 3rd grade children and their parent playing a cooperative board game for thirty minutes with another, previously unknown, parent-child dyad. We coded children's prosocial behavior (behavior that benefited another more than oneself), their nonverbal or verbal expressions of distress or need, and their responses to others' expressions of distress or need. We also coded parents' modeling of prosocial behavior and their coaching or praise/criticism of their child's prosocial behavior. We obtained two other measures of children's prosocial behavior: teachers' ratings, and children's responses to a donation opportunity. Results showed that whereas the majority of parents modeled prosocial behavior throughout the game, most parents did not coach nor praise children's prosocial behavior. Most children displayed prosocial behavior during the game. We will also report on associations between parents' and children's emotional communication and children's prosocial behavior, measured during the game and through teacher ratings and donation behavior.

#14 Teeth Clipping in Baby Pigs: Impacts on Growth and Injury Scores

*Jennifer Lyle**, *Lauryn Haynie*, *Madison Horne*, *Kim Meloy*, *Chris Treyz*, *Mike Ashby*,
C. M. Wood
Animal and Poultry Sciences

Standard management for baby pigs include clipping teeth to prevent injury. This study addresses two questions: 1) does clipping affect growth of the pigs during lactation and after weaning; and 2) does the severity of injuries decrease if teeth are clipped. Three groups of litters (n=41), 404 pigs total, were used. There were two treatments: control (no clipping), and clipping. Clipping was done by trained personnel. Pigs were blocked into normal or low birth weight groups. Within each block, piglets were randomly assigned to treatments on a pairwise basis. Throughout the study, pigs were periodically weighed and scored for injuries (0=no injury; 3=severe injury). At weaning, pigs were grouped into pens according to body weight and initial treatment. There were no significant differences between clipped and control pigs for growth during lactation. On day 14, clipped pigs had a higher ($P < 0.05$) average injury score (0.89 vs. 0.77). Injury scores after weaning did not differ among pens, and in general decreased over time. Weight gain the first week after weaning varied among pens ($P < 0.05$) but not during the remaining three weeks. In summary, clipping needle teeth had no permanent effect on growth or injury scores of piglets.

#15 Genome-Wide Screen of Desiccation Essential Genes in *Saccharomyces cerevisiae*

*Michael Manning**, *Richard Helm*, *Malcolm Potts*
Biochemistry

The ability of *Saccharomyces cerevisiae* to recover from a desiccated state requires the coordinated response of many genes. Surprisingly, little is known about the details of this response. The completion of the *Saccharomyces* Genome Deletion Project (1999) has created the possibility to conduct a genome-wide screen of mutants whose gene deletion leads to a lethal phenotype after a desiccation and subsequent rehydration. A high throughput protocol was developed to screen the mutants. Data inferred from the knockout studies suggests genes responsible for metabolism, stress, and membrane structure/organization are key to desiccation survival. Interaction studies revealed two networks statistically overrepresented in the data set. One network, the SAGA-like SLIK complex, is a known stress response mechanism that allows the retrograde response to occur. This suggests a clear link between desiccation/rehydration, mitochondrial dysfunction, the SLIK complex, and the retrograde response.

#16 Young Adults' Exposure to Community Violence: Psychological Outcomes of Family and Stranger Violence

Shelby Elaine McDonald, Sara C. Haden, M.A., Angela Scarpa, Ph.D.*
Psychology

The current study compared the impact of community violence by stranger and family perpetrators on victim outcomes in a college sample. Based on previous literature, we hypothesized that victimization by a family member would be related to elevated depression and anxiety, while stranger violence would be linked to higher levels of aggression and PTSD symptoms in a sample of college students. Results indicated that being slapped or punched was the most common form of victimization (56.3%), and the majority of experiences were perpetrated by strangers (66%) rather than family members (34%). With regard to our predictions, t-tests revealed victimization by a stranger was significantly related to higher self-reports of physical aggression ($t(221) = 4.77, p = .005$). In addition, a trend was found supporting higher levels of verbal aggression for victimization by a stranger ($t(222)=1.95, p=.095$). There were no significant differences between stranger and family violence for the depression, trait anxiety, or PTSD measures. Consistent with previous literature, our investigation found support for increased physical and verbal aggression as an outcome of community violence involving a stranger. However, unlike previous findings no significant relationship was found between other outcomes and stranger or family violence.

#17 Autonomic Arousal in Children with Comorbid Attentional Problems and Childhood Proactive and Reactive Aggression

Shelby Elaine McDonald, Dr. Angela Scarpa*
Psychology

The current study explored autonomic arousal in children who display concurrent attentional problems and antisocial behavior. Proactive aggression was used as a measure of early antisocial behavior as DSM-IV criteria for conduct disorder was not developmentally appropriate to assess antisocial behavior in our young participants. We tested two hypotheses: 1) Proactive aggression would be negatively related to resting heart rate and skin conductance and 2) Children with high proactive aggression scores and diagnoses of Attention Deficit Hyperactivity Disorder, in particular, would be characterized by low baseline heart rate and skin conductance. No significant relationships were revealed for the mediating effect of either aggression type and the ADHD variables on autonomic arousal; however, the findings indicated some potential interactions with heart rate that approached the level of a trend. Post-hoc probing supported the moderating effect of ADHD on heart rate for both the dichotomous and continuous measures.

#18 Battery-Sensing Intrusion Protection System (B-SIPS)

Faiz Munshi, Wayne Chiang, Tim Buennemeyer*
Electrical and Computer Engineering/Computer Science

Handheld mobile devices (HHMD) present researchers with two major challenges – limited battery power and memory. Due to these resource constraints, it is not feasible to continuously operate sophisticated intrusion detection and anti-virus programs on most HHMDs. In an effort to contribute to the field of intrusion detection, our research proposes an innovative intrusion detection system (IDS) for mobile devices in a wireless environment based on battery dissipation characteristics. In our prototypical system, each mobile host runs a client software package that monitors battery drainage in relation to normal device activity. The HHMD transmits its readings to a database server (DBS), which in turn keeps track of reported battery characteristics and activity from other HHMDs. An attempted intrusion will cause the battery to discharge at a faster rate than normal. A host intrusion protection engine (IPE) will examine threshold breach anomalies, correlate the attack activity, and then alert the device user of potential attacks. In the future, the IPE will offer the security administrator filtering tools to mine the data and conduct forensic attack analysis, employing modern data visualization methods. This research effort seeks to develop a methodology, design and build a system, and then further explore this nontraditional IDS approach. Beyond creating an effective agent-based intrusion detection approach, this work seeks to provide a complementary intrusion detection technology towards a more robust multilayered network defense mechanism.

#19 ArsR Homolog YgaV Autoregulates the Theorized ygaV-ygaP Rhodanese Operon of Escherichia coli

Katie Paul, Timothy Larson
Biochemistry*

The Escherichia coli genome is predicted to encode nine proteins with sequence similarity to rhodanese, an enzyme that catalyzes transfer of sulfur from thiosulfate to cyanide. The functions of YgaP, a membrane-associated rhodanese, and previously characterized rhodanases PspE and GlpE of E. coli, all remain unknown. The ygaV gene is located 10 base pairs upstream of ygaP, and is predicted to encode a protein of the ArsR family of prokaryotic transcriptional metalloregulators. This work determined that YgaV controls transcription of the presumptive ygaV-ygaP operon. It was found that a ygaV-lacZ transcriptional fusion was expressed at a level that was about 13 fold higher in a ygaV chromosomal deletion strain compared with its expression in a wild-type strain, indicating that YgaV is a transcriptional repressor of its own promoter. This promoter region was localized to a 120 base pair region upstream of ygaV. The YgaV repressor was overexpressed and purified. Electrophoretic gel mobility shift assays revealed specific, high affinity binding of YgaV to the promoter region, with an estimated Kd of 35 nM to 55 nM. Further research is aimed at identifying effectors that decrease the affinity of YgaV for its operator, as well as confirming the cotranscription of ygaV and ygaP. Elucidation of molecular details of regulation of the ygaV-ygaP operon by YgaV is expected to demonstrate the physiological function of the operon to cellular sulfur metabolism.

#20 Importance of Physicians' Knowledge of Autism Spectrum Disorder

Rachel Rhoades, Dr. Angela Scarpa, Brenda Salley, Rachel Rhoades, Kristen Fenton
Psychology*

Several studies have found that the average age of diagnosis for Autism Spectrum Disorder (ASD) is 4 years, despite the availability of screening tools for the child's 18 month check up. In the current study, a survey was distributed to families with a child with ASD to assess the diagnostic process and the need for related services in Virginia. 160 caregivers completed the survey. Results indicated that the average age of diagnosis was 4 years 9 months and that 18% of professionals who diagnosed the child provided caregivers with no further information about ASD or related services. This is concerning because 73% of caregivers turned to the media for further information. Behavioral Treatment, Social Skills Training, Autism Specialty Clinics, Diagnostic Services, and Sensory or Auditory Integration Training were found to be perceived by caregivers as both high in need and low in availability. A review of scientific evidence showed that Behavioral Therapy and Social Skills Training have empirical support, but Sensory or Auditory Integration Training does not. It is recommended that physicians receive further training about ASD so that children are diagnosed at earlier ages and caregivers receive information about services with empirical support.

#21 MagnetoHydroDynamic Propulsion

W. Rob Story, Matt Martz
Aerospace and Ocean Engineering*

Since the earliest days of sea travel engineers have been searching for more effective means of propulsion. From the simple paddle to the modern marine propeller, propulsion methods have undergone rapid transformations as technology has advanced. Ancient mariners used sails to harness the power of the wind, a propulsion method that was the predominant power source for most ships until the industrial revolution over a century ago, which led to power plants that utilized paddle wheels and marine screws. The research intends to advance the knowledge of a new propulsion method that uses no moving parts: MagnetoHydrodynamic (MHD) Propulsion. It is based on the fundamental physical interaction between electrical and magnetic fields, which can be crossed to induce a force in water. The application of this propulsion method could be far reaching, from use in surface ships to smaller applications such as autonomous underwater vehicles. The research group has constructed a prototype that will demonstrate this unique form of propulsion, the testing of which may lead to further prototypes. It is intended that one day the research being performed will contribute to MHD drives' recognition as a viable means of propulsion in marine craft around the world.

Agriculture and Animal Sciences

#22 Field Efficacy of *Trichogramma ostrinae* for Suppression of European Corn borer in Sweet Pepper

Vonny M. Barlow*, Thomas P. Kuhar, Michael P. Hoffmann, Shelby J. Fleischer, Ruth V. Hazzard, Pam Westgate
Entomology

We have concluded a two-year evaluation of the ability of *Trichogramma ostrinae* (Peng & Chen) to locate and parasitize *Ostrinia nubilalis* Hübner egg masses in sweet (Bell) pepper. A total of 9 sites were used in Virginia, Pennsylvania and Massachusetts. Each site consisted of 0.02 ha *T. ostrinae* release and non-release plots with \approx 300 sweet (Bell) peppers. Starting at first fruit set 5 inundative releases of \sim 30,000 to 50,000 *T. ostrinae* per site were made using heavy waxed paper release "capsules". Assessment of *O. nubilalis* egg mass parasitization by *T. ostrinae* was done by visual inspections (timing determined using phenology models) of \approx 100 plants in each plot. All *O. nubilalis* egg masses that were found were carefully placed into gelatin capsules to assess parasitism. Harvests of mature pepper fruit was made at regular intervals with a sub sample of \approx 200 fruit sampled destructively to assess fruit damage by *O. nubilalis*. *Trichogramma ostrinae* parasitization in both years of the study was significantly higher ($P = 0.0002$ and $P = 0.003$) in release plots compared to controls (65.3% and 40.4% respectively). Fruit damage by *O. nubilalis* in release plots was less than control plots (9.9% and 33.5% respectively) in the first year ($P = 0.002$) followed by a nearly significant ($P = 0.06$) comparative reduction of 14.9% to 6.7% in the second year of the study. The data suggest that the use of the parasitoid *T. ostrinae* is an effective means of controlling *O. nubilalis* in bell pepper.

#23 Determination and Analysis of the Complete Genomic Sequence of an Avirulent Strain of Avian Hepatitis E Virus: Identification of Critical Aminoacid Mutations in the Capsid Gene

Padma Billam*, Zhifeng Sun, Xiang-Jin Meng
Biomedical Sciences and Pathobiology

Avian hepatitis E virus (avian HEV) was identified from chickens with hepatitis-splenomegaly (HS) syndrome and is genetically and antigenically related to human HEV. Recently it was found that apparently healthy chickens were also seropositive for avian HEV. In the present study, the genomic sequence of an avirulent strain of avian HEV excluding the 145 nucleotides at 5' end was determined by primer walking strategy using the primers designed on the basis of the prototype avian HEV. Sequence analysis shows that the open reading frame 2 (ORF2), which codes for the capsid gene of avirulent avian HEV shows a nucleotide sequence identity of 90.66 % with the prototype avian HEV. Six non-silent mutations (C4R, A288T, M359L, S436A, S511N, and R600K) were identified in this region. The ORF3, which encodes a cytoskeleton-associated phosphoprotein, had four non-silent mutations with 96.97 % nucleotide sequence identities with the prototype virus. Genetic variations such as non-silent mutations and deletions were observed in the ORF1 sequence as well. Overall, the avirulent strain of avian hepatitis E virus has a sequence homology of 90.06% with the prototype avian HEV. The identification of significant non-silent mutations in the capsid gene and other coding regions suggests that these mutations may play a role in the attenuation phenotype of the virus.

#24 Toxicity of Voltage-Sensitive Chloride Channel Blockers Against Insects and Nematodes

Dhana Raj Boina, Jeffrey R Bloomquist*
Entomology

In this study, voltage-sensitive chloride channel (VSCC) blockers, 4, 4'-diisothiocyanatostilbene 2, 2'-disulfonic acid (DIDS), 5-nitro 2-(3-phenylpropyl amino) benzoic acid (NPPB), anthracene-9-carboxylic acid (9-AC), and indanyloxy acetic acid 94 (IAA-94), have been evaluated for their toxicity against nematodes, *Ceanorhabditis elegans*, *Meloidogyne incognita* and *Heterorhabditis bacteriophora*, and insect, *Drosophila melanogaster*. At 72 hrs after exposure, LC50 values (the lethal concentration required for 50% mortality of test population) of VSCC blockers ranged from 8.90 to 20.40 for *C. elegans*, and 15.96 to 30.32 µg/mL for *M. incognita*. However, these blockers were found to be not toxic to entomopathogenic nematode, *H. bacteriophora* even at 200 µg/mL 168 hrs after exposure. VSCC blockers found to be moderately toxic to *D. melanogaster* at 48 and 72 hrs after treatment and the toxicity was increased by the addition of piperonyl butoxide (PBO). The VSCC blockers tested have shown promise as an alternative for the methyl bromide soil fumigation for controlling soil nematodes and insects. In our future studies, the mode of action of these compounds will be studied using electrophysiological and other molecular techniques.

#25 Grazing Behavior of Beef Steers Grazing Lakota Prairie Grass, Endophyte Infected Tall Fescue, and Novel Endophyte Infected Tall Fescue

Holly Terry Boland, G. Scaglia, J.P. Fontenot, A.O. Abaye, R.L. Stewart Jr., and R. Smith*
Animal and Poultry Sciences

Endophyte infected tall fescue (*Festuca arundinacea* Schreb.) is the most dominant grass used for pasture in the Southeastern United States. As a result, fescue toxicosis is a major concern economically and for animal well-being. Producers need alternative forages for grazing cattle that do not exhibit this negative aspect. The objective of this experiment was to determine the grazing behavior of cattle grazing Lakota prairie grass (L) (*Bromus catharticus* Vahl.), Kentucky 31 endophyte infected tall fescue (E+), and Q4508-AR542 novel endophyte tall fescue (Q) with the use of electronic behavior data recorders. Twelve Angus-crossbred steers (initial BW 279 ± 8 kg) each wore individual data recorders in four, 5 d sampling periods during the months of June through September, 2004. There were no significant differences between treatments for time spent grazing. Steers grazing E+ spent less time ($P < 0.05$) lying and ruminating than steers grazing Q or L. Conversely, time spent standing and idling for steers grazing E+ was higher ($P < 0.05$) than for steers grazing Q or L. These results indicate that L and Q may offer benefits to producers due to more time spent in productive activities during summer months.

#26 Developmental Regulation of Nutrient Transporter mRNA Abundance in the Small Intestine of Chickens

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Animal and Poultry Sciences

The objective of this project was to investigate differences in nutrient transporter mRNA in the intestine of two genetically selected broiler lines (A and B) using real time PCR. The candidate genes included a peptide transporter, PepT1, three amino acid transporters (bo,+AT, rBAT, EAAT3), and a digestive enzyme, APN. Tissue was collected at embryo day 18, embryo day 20, day of hatch, and days 1, 3, 7 and 14 posthatch. Total RNA was extracted from all intestinal segments of four male birds from both strains at each time point. Total RNA was reverse-transcribed and used for real time PCR. For PepT1, line B expressed higher quantities of mRNA compared to line A ($P = 0.0007$). Line A exhibited approximately 3,600 molecules of mRNA per nanogram of total RNA, while line B exhibited 6,300 molecules. Abundance of bo,+AT, rBAT, EAAT3, and APN mRNA was highest in the distal small intestine, while PepT1 mRNA was highest in the proximal small intestine. Results obtained from this study increase our understanding of nutrient absorption in the developing chick and improve our ability to formulate diets that meet the digestive and absorptive capabilities of broilers.

#27 Abundance and Bionomics of *Ochlerotatus japonicus* (Diptera: Culicidae) in Two Counties in Southwestern Virginia

*Devin Grim**, *B.T. Jackson*, *S.L. Paulson*
Entomology

Ochlerotatus japonicus is an exotic mosquito species imported from Asia. This species has been shown to be a competent laboratory vector of La Crosse virus and West Nile Virus, therefore it is important to understand its bionomics in virus endemic areas. Field collections were made in 2003 and 2004 to demonstrate the increasing abundance and seasonal distribution of *Oc. japonicus* in Southwestern Virginia. In 2003, *Oc. japonicus* made up less than 1% of the total number of mosquitoes trapped. *Oc. japonicus* was collected from five of six trap sites and all but one of the *Oc. japonicus* collected was trapped in August. In 2004, *Oc. japonicus* was collected at all six trap sites and comprised 16.8% of the total seasonal catch, making it the most abundant *Ochlerotatus* species caught. The number of *Oc. japonicus* trapped increased significantly after June and stayed consistently throughout the rest of the sampling season. Arboviruses have not been isolated from field collected *Oc. japonicus*, but because of the species increasing abundance and rapid spread through virus endemic areas, this species should continue to be monitored for its potential as a natural vector of La Crosse virus and other arboviruses.

#28 Cardiovascular Changes in 17-day-old Fetuses of Type I diabetic Mothers using a Mouse Model.

J. Claudio Gutierrez, *Terry C. Hrubec*, *M. Renee Prater*, *Bonnie J. Smith*, *Larry E. Freeman*,
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Biomedical Sciences and Pathobiology

Maternal diabetes mellitus is associated with increased fetal teratogenesis, including cardiovascular defects. Using a mouse model, late-gestation fetal heart and great vessel morphology were analyzed in fetuses from control and diabetic dams. ICR female mice were injected with streptozocin (200 mg/kg) to induce diabetes (n=8). Non-hyperglycemic females were used as a control (n=8). At day 17 of gestation, females were euthanized by cervical dislocation. One fetus was selected per litter to analyze the heart and great vessels. Six additional fetuses showing external malformations (spina bifida and/or exencephaly) were selected from the diabetic group. Fetuses were fixed in absolute ethanol for analysis. Fetal thoraxes were processed using routine histopathologic techniques, and 7 μ m transversal sections were stained with hematoxylin and eosin. Digital images of sections were made using an Olympus microscope and camera, and images imported into computer software (Image J and Photoshop 7.0) to analyze different regions of the heart. Student *t* tests for means were performed to compare the difference between groups ($p < 0.05$). Maternal hyperglycemia caused a significant dilation of both left and right fetal ventricular chambers, a reduction of ventricular area and an increase in transversal aortic area. Occasional additional defects were found in fetuses that also showed external malformations.

#29 Association of DAO and SAHH in *Nicotiana Tabacum*: Implications for a Nicotine Metabolic Channel

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Plant Pathology, Physiology and Weed Science

N-methylputrescine oxidase (MPO) is a diamine oxidase responsible for formation of the pyrrolidine ring of nicotine in *Nicotiana tabacum*. A purportedly pure MPO protein from tobacco root extracts was used to generate immune antiserum in rabbits. The antiserum was used to screen a tobacco root cDNA expression library resulting in the isolation of clones encoding S-adenosylhomocysteine hydrolase, SAHH. Nevertheless, the anti-SAHH immunodepletes MPO activity from tobacco root extracts, indicating that SAHH and MPO associate in vivo. SAHH is a member of the S-adenosylmethionine (SAM) recycling pathway and its activity results in the effective detoxification of S-adenosylhomocysteine, a by-product of all SAM methyltransferases. Based on these data, we propose that SAHH and DAO associate as part of an alkaloid multienzyme complex that includes the SAM-dependent putrescine methyltransferase (PMT). PMT activity forms both N-methylputrescine and the potent methylation inhibitor S-adenosylhomocysteine (SAH). In this hypothesized multienzyme complex, SAHH could promote alkaloid biosynthesis by reducing the accumulation of SAH from the confines of an alkaloid metabolic channel and thereby preventing competitive inhibition of PMT.

#30 Chemical Parameters, Particle and Nutrient Removal with Separation, Settling, and Aeration in Flushed Dairy Manure

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Dairy Science

Data were collected for one year from a working manure system consisting of a mechanical screen separator, gravitational settling basin (SB), and three aerated storage tanks in series. The manure from 140 lactating dairy cows was flushed with ~ 40,000 L recycled wastewater 4x per day. The blend was separated to solid and liquid portions by a mechanical solid-liquid manure separator. The liquid portion flowed into a SB and by gravity into the first aerated tank (pump power: 5 kg O₂/h). The wastewater was pumped into sequential aerated tanks. Weighted results were analyzed using Proc Mixed in SAS. Mechanical separation of the blend, including the solids and nutrients from the flushwater, reduced total (TS) and volatile solids (VS) by 19 and 25%, total Kjeldahl N (TKN) by 9%, and total P (TP) by 18%. The SB reduced TS by 11%, VS by 12%, and TKN and TP by 10%. The combined effect of aeration and settling in tanks 2 and 3 decreased TS and VS by 22% and 24%, respectively, and TKN and TP were reduced by 14% and 13%. The combined tanks increased dissolved oxygen from 0.4 to 1.1 mg/l and the oxidation-reduction potential from -230 to 16 mV.

#31 Reactive Oxygen Species in Pesticides-induced Neuronal Cells Cytotoxicity, In Vitro

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Department of Biomedical Sciences and Pathobiology

Human exposure to multiple pesticides is very likely due to the indiscriminate use of pesticides in agriculture and in household. We and others have demonstrated that exposure to endosulfan and zineb causes dopaminergic system dysfunction in vivo. We hypothesized that these chemicals induce cytotoxicity through reactive oxygen species (ROS) formation. We have found that both endosulfan and zineb are cytotoxic to human neuroblastoma cells (SH-SY5Y), in vitro in a dose-dependent (50-400 μ M) manner as determined by LDH release. Exposure to mixtures of 100 μ M endosulfan and 100 μ M zineb enhanced both the early apoptosis and late apoptosis/necrosis compared to individual chemicals. Cells exposed to individual pesticides increased the production of ROS both in a dose- and time- dependent manner. Mixture of pesticides significantly enhanced the production of these ROS compared to cells exposed to individual pesticide. Cells treated with pesticides showed a significant decrease in superoxide dismutase and glutathione peroxidase and catalase activities. Furthermore, these pesticides induced lipid peroxides formation in SH-SY5Y cells. Taken together, these findings support the above hypothesis and suggest that the cytotoxicity of endosulfan and zineb, both individually and in mixtures may, at least in part, be associated with the generation of ROS.

#32 Tissue-specific Analysis of Prion Expression in Early Bovine Fetuses

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Large Animal Clinical Sciences*

The prion protein (PrP) is best known for its mis-folded, pathogenic isoform, which is regarded as the infectious agent in transmissible spongiform encephalopathies. However, the role of normal, host-encoded cellular PrP is poorly understood. Our previous data revealed PrP gene expression in bovine embryos throughout pre-implantation development. In order to map the ontogeny of cellular PrP expression in cattle, we sought to analyze in early bovine fetuses (1) total PrP gene expression by real-time quantitative PCR (QPCR), and (2) tissue-specific PrP expression by immunohistochemistry. Fetuses were obtained from donor cattle artificially inseminated and subjected to mid-ventral laparotomy on Days 32 (n = 2) and 39 (n = 2). For QPCR, RNA was isolated using an RNeasy® mini kit and cDNA was generated by reverse transcription with random hexamer priming. For immunohistochemistry, sectioned fetuses were probed with SAF 32 primary anti-PrP antibody and biotinylated secondary antibody complexed to horseradish peroxidase. PrP gene expression tended to be higher in Day 39 compared to Day 32 fetuses. PrP immunoreactivity was found throughout the central and peripheral nervous systems, mesonephric kidney, liver, and heart in both fetal stages. Thus, PrP is expressed in early bovine fetuses similar to the adult in a tissue-specific pattern.

#33 Attenuation Characteristics of a Vaccine Candidate against Bovine Brucellosis

Parthiban Rajasekaran, Mohamed N. Seleem, Andrea Contreras, Nammalwar Sriranganathan
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Biomedical and Veterinary Sciences*

Brucella spp. of bacteria are classified as a “class B” bioterrorism agent and cause undulant fever in humans and abortions in a variety of land and marine mammals, the disease is called “Brucellosis”. As a prophylaxis for this pathogen, which normally replicates inside macrophages of the infected hosts, the USDA approved *Brucella abortus* strain RB51 is used as a vaccine against bovine brucellosis in the USA, Chile, Mexico, Venezuela and also being introduced in India, Iraq and Iran. For expression of heterologous antigens in *B. abortus* strain RB51, we normally employ a plasmid vector containing an antibiotic resistant gene marker along with the gene encoding the heterologous antigen. This practice has always invited criticism as it has the potential to introduce antibiotic resistance genes into normal flora as well as pathogens in the vaccinated animals. Construction of a plasmid without antibiotic resistance gene would present a minimum of environmental risk. *B. abortus* strain RB51 lacking the *leuB* gene necessary for biosynthesis of an essential amino acid (leucine) would not be able to grow inside macrophages, a known nutrient limiting environment. Complementation of these *leuB* mutants with a plasmid carrying the functional *leuB* gene encoding the amino acid would facilitate the survival of strain RB51 inside macrophages. In our experiment the *leuB* gene of *B. abortus* strain RB51 was disrupted using a suicide vector. The resultant *leuB* mutant of *Brucella* cannot grow in a leucine deficient minimal media. Complementation of the *leuB* mutant with a plasmid carrying a functional copy of the *leuB* gene allows survival of the auxotrophic mutant in leucine deficient minimal medium. Apart from the essential *leuB* gene, a heterologous gene encoding green fluorescent protein (GFP) was also cloned in the plasmid. We demonstrate that the *leuB* auxotroph of *B. abortus* strain RB51 vaccine maintains plasmid containing the *leuB* gene and expresses GFP inside infected macrophages. To validate the utility of this over-expression plasmid, mice immunized with strain RB51 containing the *leuB*/GFP construct will be assessed for a) the presence of plasmid in strain RB51 recovered from spleens and b) the presence of specific GFP antibody in serum.

#34 Targeted Delivery of Antibiotic Loaded Carbon Nanotubes for the Control of Intracellular Bacterial Pathogens

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Intracellular bacterial pathogens like *Brucella* sp., *Salmonella* sp., and *Mycobacterium* sp., evade killing by host phagocytic cells, there by requiring long-term antimicrobial therapy, with the potential of creating drug resistant pathogens. Targeted delivery of antimicrobials to the infected cells using nanoparticles may effectively address the above issues and also help in the reduction of the antibiotic dose and duration required to control the intracellular pathogen. The objective of our study was to test the targeted delivery of ceftiofur and gentamicin against *Salmonella cholerae suis* infected mouse macrophage cell line J 774 A.1 using carbon nanotubes (CNT). Either native or Polymer coated activated CNT were loaded with Ceftiofur or gentamicin. Effective targeting of the drug was further mediated by the antigen-binding moiety (Fab) of *Salmonella* anti "O" antibody onto the CNT carrying antibiotics. The antibiotic loaded CNT were washed several times to remove the residual antibiotics before being used to treat infected macrophages. Effective intracellular delivery of the drug was evaluated by plating serial dilutions of lysed macrophages that were incubated with loaded CNT and appropriate controls. The cultures were observed at periodic intervals for bacterial multiplication. The preliminary results showed a significant reduction in the colony forming units of *Salmonella* in gentamycin loaded CNT compared to the control. There was no difference observed in the number of *Salmonella* isolated from cells treated with ceftiofur plus antibody loaded CNT and ceftiofur control. Transmission Electron Microscopy confirmed the phagocytosis of CNT by the macrophages. In conclusion, our preliminary result suggests that delivery of antibiotic using CNT in the control of intracellular pathogens is feasible. Targeting intracellular pathogens using this technique may have the potential of treating chronic infections due to intracellular pathogens.

#35 Mesotrione for Preemer Gence Broadleaf Weed Control in Turfgrass.

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Plant Pathology and Weed Science

Mesotrione is a corn herbicide that has preemergence and postemergence activity on multiple field and turfgrass weed species. Currently, mesotrione is being evaluated for preemergence and postemergence weed control in Kentucky bluegrass, perennial ryegrass, and tall fescue turf. In tilled cropping systems, mesotrione controls several broadleaf weed species through residual activity in treated soil. Although broadleaf weeds have been controlled in turf with postemergence treatments, evidence for residual activity on preemergence weeds is lacking. Our objectives were to determine the most effective rate and number of mesotrione treatments to extend preemergence weed control and to determine if various broadleaf weeds are controlled preemergence. Three field trials were conducted during the summer of 2005 at the Virginia Tech Turfgrass Research Center and The Glade Road Research Facility in Blacksburg, Virginia. Each site was treated with glyphosate at 4.48 kg ai/ha to control existing vegetation and allow for substantial weed emergence. Weed populations varied between sites. However, common purslane, dandelion, large crabgrass, yellow nutsedge, and yellow woodsorrel were evaluated either singly or repeatedly at three different sites. Preemergence application timing for sites one, two, and three were March 29, April 11, and May 11, respectively. Sequential applications were made three weeks after trial initiation. Treatments were applied at 280 L/ha and included the following: Mesotrione at 0.14, 0.21, and 0.28 kg ai/ha applied alone, mesotrione at 0.14 kg ai/ha followed by mesotrione at 0.14 kg ai/ha, mesotrione at 0.21 kg ai/ha fb mesotrione at 0.21 kg ai/ha, and isoxaben at 1.48 kg ai/ha applied alone. Mesotrione applied alone at 0.28 kg ai/ha controlled weeds better than 0.14 and 0.21 kg ai/ha. Mesotrione at 0.28 kg ai/ha controlled yellow nutsedge 83 and 100% at sites one and three, it controlled prostrate knotweed and yellow woodsorrel 100% and large crabgrass and dandelion 85 and 93%, at sites two and three. Mesotrione at 0.21 kg ai/ha fb mesotrione at 0.21 kg ai/ha controlled yellow nutsedge, prostrate knotweed, and yellow woodsorrel 100% at sites one and two, 56 DAT. Mesotrione at 0.21 kg ai/ha fb mesotrione at 0.21 kg ai/ha controlled large crabgrass and dandelion 75% at site three and 93 and 86%, respectively at site two. Mesotrione at 0.21 kg ai/ha fb mesotrione at 0.21 kg ai/ha controlled large crabgrass 36% at site three but less than 5% at sites one and two, 120 DAT. Yellow woodsorrel was controlled 100% 120 DAT regardless of rate or sequential application.

#36 High-level Heterologous Gene Expression in *Ochrobactrum anthropi* using an A-rich UP Element

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Biomedical Sciences and Pathobiology

DNA regions that flank a gene's promoter play an important role in determining transcription efficiency by interacting with the carboxy-terminal domain (CTD) of RNA polymerase α -subunit. We placed an adenine (A)-rich upstream element (UP) between -38 and -59 of the core *trc* promoter to enhance gene expression in *Ochrobactrum anthropi* up to 66-fold. The high level of expression achieved by the UP element and the N-terminus fusion of a 6xHis epitope tag facilitated detection and purification of heterologous proteins directly from *O. anthropi*. This will facilitate the use of *O. anthropi* as a potential bioremediation tool and a biopesticide agent.

#37 Duration of Continuous No-tillage Management and Soil Nitrogen Status in the Virginia Coastal Plain

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Crop and Soil Environmental Sciences

Efficient N fertilization is paramount to both economic crop production and protection of ground and surface waters. Elevated soil organic matter in long-term no-tillage soils may significantly influence N cycling and potentially result in reduced N fertilizer requirements for crops where N uptake patterns match N mineralization. In 2004, approximately 54% of the annual crop production area of Virginia was managed no-till. Little research has been conducted to investigate the N status of long-term no-tillage soils in the mid-Atlantic Coastal Plain region. The objective of this research was to determine the relationship between duration of no-tillage management and soil N status. Thirty-two sites were selected across three soil series in the Virginia Middle Coastal Plain with a history of no-tillage ranging from 2 to 14 years. All sites were in a corn (*Zea mays* L.) / wheat (*Triticum aestivum* L.) or barley (*Hordeum vulgare* L.) / double-crop soybean (*Glycine max* L.) rotation. The three soils series, represent a significant portion of the land area used for agronomic crop production in the region. Half of the sites received biosolids 5 years prior to the sampling date. Five surface samples were collected from 0 - 2.5 cm, 2.5 - 7.5 cm and 7.5 to 15 cm immediately following corn harvest in 2005 and analyzed for total C and N, 2 N KCl extractable $[\text{NH}_4^+ + \text{NO}_3^-]$ N and amino sugar N. Total C, N, and amino sugar N increased with increasing duration of no-tillage management, particularly in the 0 - 2.5 cm layer. Soils receiving biosolids had higher levels of total C and N, and amino sugar N, regardless of tillage or soil texture. Total C and N, and amino sugar N tended to be higher in the finer textured soils regardless of tillage or biosolids history. Future research will determine if increased N status of no-tillage soils results in decreased fertilizer N response and if changes in N fertilizer needs can be predicted using simple laboratory procedures.

#38 Reducing the Environmental Impact of Livestock Production by Engineering a Nutritionally Enhanced Soybean

Amanda Stiles, Elizabeth Grabau*

Plant Pathology, Physiology and Weed Science

Phytic acid, also known as myo-inositol hexakisphosphate or Ins(1,2,3,4,5,6)P₆, is the major storage form of phosphorus in plant seeds. Phytic acid is poorly digested by non-ruminant animals such as swine and poultry, and it chelates cations such as calcium, iron, zinc, and potassium, classifying it as an anti-nutrient. The excretion of unutilized phytic acid in manure translates to an excess amount of phosphorus runoff that can lead to eutrophication of lakes and ponds. Understanding the phytic acid biosynthetic pathway will allow for the development of low phytic acid soybeans by the down-regulation of specific genes. The goal of our current research is to elucidate the pathway(s) for phytic acid biosynthesis in soybean (*Glycine max*). We have identified seven soybean genes with homology to known inositol kinase enzymes. We have examined the expression of these genes in seed tissues and expressed these genes as GST-fusion proteins that will be characterized for enzyme kinetics. To understand the contribution of each kinase gene to phytic acid biosynthesis, an RNA interference approach will be employed. Silencing vectors will be generated and bombarded into soybean embryogenic culture using the gene gun. The culture may be examined for down-regulation of each gene, and the resulting inositol phosphate profile analyzed using HPLC.

#39 Studies on the Interaction between Root Knot Nematode, *Meloidogyne Incognita*, and European Corn Borer, *Ostrinia Nubilalis*, in Corn, *Zea Mays*

Siddharth Tiwari, Edwin E. Lewis, Roger R. Youngman*

Entomology

Greenhouse experiments were conducted to evaluate the reciprocal effect of two different herbivores, *Meloidogyne incognita* and *Ostrinia nubilalis* on one another in potted corn. The first experiment investigated the effect of *O. nubilalis* stalk tunneling on *M. incognita* juvenile penetration and egg production in corn roots, involving three levels of third instar *O. nubilalis* (0, 1 and 3 per plant) at 6-, 8- and 10-leaf growth stages. The reciprocal experiment investigated the effect of *M. incognita* root penetration on *O. nubilalis* stalk tunneling, involving four levels of *M. incognita* inoculation (0, 2000, 4000 and 6000 eggs and juveniles per plant) at 6-, 8- and 10-leaf growth stages. The level of *O. nubilalis* larvae per plant significantly affected *M. incognita* juvenile penetrations in corn roots. Mean penetration numbers of 16.5 and 13.3 for plants infested with 1 and 3 larvae, respectively, were significantly less than the mean penetration number of 24.4 for plants with 0 larvae. Levels of *O. nubilalis* larval infestation had no effect on *M. incognita* egg production, but plant growth stage had a highly significant effect on *M. incognita* egg production. In contrast, *O. nubilalis* tunneling was not affected by *M. incognita* inoculation level or plant growth stage.

#40 Reduced Pesticide Exposure in Turfgrass with Wet Blade Technology

John B. Willis, Dan B. Ricker and Shawn D. Askew
Plant Pathology and Weed Science*

Wet Blade (WB) technology directs pesticides to cut portion of turfgrass leaves during mowing by wetting the underside of mower blades with solution. Pesticide application during mowing eliminates the need for separate broadcast spray application, saving time and money. WB technology perceivably limits pesticide drift and worker exposure during application, although data has not been collected. However, WB applies more concentrated solution compared to traditional methods, possibly increasing pesticide exposure when re-entering treated areas. Our hypotheses are, WB applications reduce pesticide drift and applicator exposure, while increasing pesticide exposure to foot traffic in treated areas after application. Thus our objectives were to evaluate spray drift, applicator exposure, and re-entry exposure with WB compared to traditional application methods. Chemical solution applied with WB did not significantly drift as assessed with spectrophotometric analysis of tracer dye. Other application methods resulted in a significant percentage of spray solution moving off target. Applicators were exposed to spray solution with WB applications less than or equal to traditional application methods. WB applications resulted in less foot traffic exposure than traditional applications 10 minutes after treatment. In conclusion, using WB technology reduces spray drift, applicator exposure, and re-entry exposure compared to traditional application methods.

#41 Analysis of Plum Curculio Strains using Mitochondrial *COI* Gene and *WSP* Gene of *Wolbachia* Symbiont in Eastern United States

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Entomology*

We investigated genetic structure of plum curculio (PC) geographic populations by using the partial *mtCOI* gene and distribution patterns of *Wolbachia* infection associated with PC strain distribution in this study. The 50 samples from ten geographic populations of the eastern US were placed into two major clades (\approx 5% divergence): 1. northern group: NY and MA populations 2. southern group: the other 8 populations. Furthermore, there are two major clades within the southern group: mid-southern group included 17 samples and far-southern group included 21 samples. There were 3 *Wolbachia* strains found in all 86 tested samples. PCR-RFLP analysis revealed that 12, 20, 36 and 18 samples are infected by wCne1, wCne2, wCne3 and wCne1+2, respectively. Therefore, current results suggest that northern group of PC were infected by *Wolbachia* strains wCne1 and wCne2, far-southern group were infected with the wCne3 strain and the Mid-Atlantic region is the convergence area. Mitochondrial DNA analysis indicated a closer relation of the mid-southern PC clade to the far-southern clade than to the northern clade. However, *Wolbachia* symbionts in mid-southern PC are more closely related to those in northern PC than to those in far-southern PC.

Arts, Architecture and Urban Studies

#42 Festival, Capturing the Seasonal Change

*Myung-Hee Chae**

Apparel, Housing, and Resource Management

Festival, Capturing the Seasonal Change The garment, Festival, was inspired by the celebration of the seasonal change from winter to spring. Typically, in the winter, most of leaves fade and turn into winterscapes of bare branches. On the other hand, during the spring, the vibrant colors return. The moment in time when this seasonal change occurs is what this garment represents. Features of the vital spring scenery were placed on the front side of the dress by making colorful beaded flowers and multi-colored blossoms, by creating the pleated effect around the 4" long front waist line with colorful trims as buds on a brown color of a trunk, and by using 1/2" short straight line stitches to decorate the top of the pleated effect as a red color of worms on the trunk. These unique features with effects of surface design techniques were used to emphasize the overall feminine appearance of the garment. Additionally, to build a strong contrast and distinct differences between the two seasons, the back view of the dress illustrates simplicity for winter, and the front view of the dress illustrates vitality for spring. Overall, various effects of creative design were incorporated into this Festival to enhance the aesthetics of the garment.

#43 The City and its Interfaces: Designing a Waterfront in St. Augustine Beach, FL

*Monica Dazzini**

Landscape Architecture

Nowadays, the improvement in mass transportation and new communication technologies allows a great amount of people to look for new job opportunities between urban areas, indeed, mobilization increased. The urban population provokes land use change, and the break of the relationship with the natural landscape by degrading key resources such as soil, water, and vegetation. There is a need for greater green areas for recreation that guarantee the health of the community and the enhancement of social bonds. Indeed, the existing waterfronts' designs failed to connect people with the natural landscape. This methodological research analyzes the components of the natural and cultural landscape in a section of beachfront in St. Augustine Beach, Florida that suffered beach erosion and development pressures due to the demand for short-term tourist locations. I propose an alternative to costly dredging and beach reclamation that includes tools and landscape modifications of this threatened site. I used GIS and remote sensing analysis to understand the phenology of the place. Finally, this research introduces a holistic design to test ideas and arguments as an option for the 'hibridization' of the landscape with an in depth analysis of the dynamics of a place to support sustainable economic developments.

#44 Marshall Plan Images

*Evan Noble**

History

I am currently researching Marshall Plan films as a subject of propaganda. These films propose viewers to adopt a more "American" way of life. I felt that presenting a poster at the symposium would help me to compile some of the images I hope to use in the final product of my thesis. I hope to submit a poster that demonstrates some of the images Marshall Planners used to encourage Europeans that an "American" way of life was preferable to their own. The actual images I hope to use will include stills from the actual films, political cartoons from American, Soviet, and European newspapers, and finally samples from a European poster contest sponsored by the Economic Recovery Plan. My goal in this poster is to bring to life much of the imagery that I discuss frequently in my research. Images will be teamed with excerpts from my own writing.

#45 The Historical Narrative and Modern Poetics

*Kamau Rucker**

English

Does contemporary American poetry lack a sense of history? Is the poetry market filled with imagists and post-confessional poets who operate predominantly in the world of the privatized, or at least introspective, I? Are the language poets about to consume poetics, leaving us with just words? Some poets have said that poetry needs to be brought back to a truer focus on the cultural operations at work in society. The list includes poets such as Shaggy Flores, Taalam Acey and Tara Betts. The list includes poets such as Carl Sandburg and Marilyn Nelson. This presentation addresses the findings from a search made for poems, from North and South America, that reference, present, or invoke, history, the findings are not limited to the academic framework. Leslie Marmon Silko, in an interview, spoke of writing saying, "All information, scientific, technological, historical, religious, is put into narrative form. It is easier to remember that way." The examples presented are intended as poems that are based in specific historical events, specific historical moments, a sense of history as a lived experience, and the notion that the world is comprised of agents involved in the forming, and framing, history versus individuals being affected by history. The presentation will explore the current literary locales of narrative historical poetry and how the tradition endures.

#46 The Logician

*Joshua Sweeney**

English

An allegorical poem addressing the attempts to fit God into the realm of science with a specific example, a man who ignores the fallacies of his argument in an attempt to intertwine religion and logic. It addresses in detail his argument, from a logical base on a fallacy of cosmology to the use of mathematical proof to prove that the universe needs a supreme power, a proof that requires assumption and twisting definitions to reach its conclusion. The speaker is an unwilling recipient of the logician's lecture.

#47 The Chinese Spatial System in Feng-shui Theory: An Analysis of its Structure and Perspectives

*An-chi Tai**

Environmental Design and Planning

This research attempts to study the spatial system of feng-shui theory and postulate a decision-making process of the design of residential architecture. It is not meant to probe the fundamental principles of the feng-shui theory but to adapt them to a structured design approach.

First, the paper will take the compass school – one of the two major schools of feng-shui – as an example to present the Chinese housing patterns that was developed from Pa Gua (the eight Dimensions) and the nine-square grid. The compass school also defines the inter-relationship of rooms in a house and locates the house in its total surroundings. Secondly, the proposed decision-making process will demonstrate a working model derived from a feng-shui master's practical design process.

Through a review of literature and interviews with a number of feng-shui masters and scholars, this research will identify several key connections between theoretical concepts and practical spatial patterns of the feng-shui theory. By way of using geometrical and dimensional analysis, the whole system can be represented by typical architectural typologies.

The feng-shui theory is about the relationship between people and space and these relationships were evident in the typical house plans as well as urban patterns of ancient Chinese society. A unique system in the architectural world of design methods and processes, the feng-shui theory is the integration of practical and theoretical views of the Chinese way of optimizing natural and social relations.

Based on I-ching, feng-shui is a complex theory of astronomy, geography, calendar, urban planning, architecture, sociology, policy, religion, etc. But its overall purpose is to organize the relationship between humans and nature. The task at hand is to develop a system of spatial patterns from I-ching and apply them in the design and planning of human experiences on this good earth of ours.

Engineering

#48 Highway Maintenance Monitoring Program

Adrian Burde, Juan Pinero, Mehmet Egemen Ozbek, Emily Prince, Walter Fedrowitz, Jenni Gray, Jesus M. de la Garza*
Civil and Environmental Engineering

In the late 1980's and early 1990's, few transportation agencies around the world considered performance-based road maintenance specification as an alternative to improve the efficiency of the services provided to the public. These initiatives are better known as Performance-Based Road Maintenance (PBRM). PBRM calls for performance-based work, in which a desired outcome is specified rather than a material or method. This type of specification promises to be an excellent tool to improve government efficiency in maintaining transportation networks, however, without proper monitoring, it could likely yield adverse outcomes. Since PBRM is relatively new, the availability of reliable and comprehensive sets of guidelines to evaluate the effectiveness and efficiency of this type of specification in the roadway maintenance arena is limited. This research presents the development of a framework for monitoring PBRM comprehensively. The framework considers the assessment of five main areas-- Level of Service Effectiveness, Cost-Efficiency, Timeliness of Response, Safety Procedures, and Quality of Services -- in order to guarantee the comprehensiveness and reliability of the monitoring process. The major contribution of this framework is to provide transportation agencies with guidelines for evaluating the effectiveness and efficiency of PBRM as an alternative delivery method to maintain the roadway system.

#49 Vibration Isolation of a Horizontal Rigid Plate Using Pairs of Pre-bent Columns

Ann Jeffers, Dr. Raymond Plaut*
Civil Engineering

This analysis considers the use of pairs of pre-bent columns bonded with a viscoelastic filler as vibration isolators. The proposed isolation device has the ability to support a relatively large static load with little deflection and offers a low axial resistance under dynamic excitation, making it ideal for isolating vertical vibrations. Four of these devices are used to support a square rigid plate which has a center of mass located at some distance from the geometric center of the plate. This eccentric weight introduces rotational movements of the plate when the system is subjected to vertical base excitations. For small harmonic vibrations about the equilibrium configuration, the governing equations for the isolator and the plate are formulated and numerically solved in Mathematica. The displacement transmissibility is used to measure of the isolators' effectiveness at mitigating vibrations transmitted to the rigid plate. This transmissibility is calculated and plotted over a range of excitation frequencies to determine ranges of frequencies for which isolation is achieved and frequencies at which resonance occurs in the system. The vibration mode shapes are shown for the first few resonant frequencies. It is found that these devices are effective at isolating vibrations for a wide range of frequencies.

#50 Spacecraft Formation Flying using GPS Hardware-in-the-loop Simulator

Scott Kowalchuk, Dr. Christopher D. Hall*

Aerospace and Ocean Engineering

The results of a Global Positioning System (GPS) hardware-in-the-loop simulation of two spacecraft flying in formation are presented. The simulations involve a chief spacecraft in a low Earth orbit (LEO), while a deputy spacecraft maintains an orbit position relative to the chief spacecraft. In order to maintain the formation an orbit correction maneuver (OCM) for the deputy spacecraft is required. The control of the OCM is accomplished using a classical orbital element (COE) controller and simulating continual impulsive thrusting for only the deputy spacecraft. The COE controller requires the relative position of the six orbital elements (semi-major axis, eccentricity, inclination, longitude of the ascending node, argument of perihelion, and mean anomaly). The deputy communicates with the chief spacecraft to obtain the current orbit position of the chief spacecraft, which is determined by a numerical orbit propagator. The position of the deputy is determined from a GPS receiver that is connected to a GPS hardware-in-the-loop simulator. The GPS simulator creates an RF signal based on a simulated trajectory, which results in the GPS receiver calculating the navigation solution for the simulated trajectory. From the current relative positions of the spacecraft the COE controller calculates the OCM for the deputy spacecraft.

#51 Development of Isotherm Parameters Describing the Sorption of 17Beta-Estradiol to Agricultural Soils

Jessica Kozarek, Dr. Mary Leigh Wolfe, Dr. Nancy G. Love, Dr. Katharine F. Knowlton*

Biological Systems Engineering

Natural steroid estrogens such as 17beta-estradiol (E2) in low nanogram per liter concentrations can adversely affect the reproductive health of aquatic organisms. The goal of this research was to develop isotherm equations describing the sorption of E2 to estimate estrogens available for transport in runoff from agricultural fields. Batch equilibrium experiments were conducted for various concentrations of E2 in a background solution of 5 mM calcium chloride and 100 mg/L sodium azide added to samples of three agricultural soils, Groseclose loam, Myatt sandy loam, and Cecil loam, from different physiographic regions in Virginia. The concentration of E2 in the liquid phase was measured by gas chromatography/mass spectrometry (GC/MS) and was used to develop sorption isotherms for each soil. The time required to reach apparent equilibrium for all soil-water systems was less than 24 hours. A linear isotherm provided the best fit to model the sorption of E2 to Cecil and Myatt soils ($R^2 = 0.94$ and 0.96 , respectively). For Groseclose soil, the general form of the Freundlich isotherm fit best ($R^2 = 0.98$), although the linear isotherm also provided a good fit ($R^2 = 0.93$). The sorption of E2 to agricultural soil was correlated to the organic carbon content of each soil (Pearson coefficient = 0.82).

#52 Insight into Biophysical Processes from Atomistic Studies of Biological Membranes

Sukit Leekumjorn, Amadeu K. Sum*

Chemical Engineering

Phospholipid bilayers constitute the primary structural element of biological membranes, and as such, they play a central role in the biochemical and biophysical processes at the cellular level, including cell protection, intercellular interactions, trans-membrane transport, cell morphology, and protein function, to name a few. The properties of phospholipid bilayers are thus of great interest from both an experimental and theoretical standpoint. Although experiments provide much of the macroscopic functions and properties of biological membranes, insight into the mechanisms at the molecular level are not often accessible by conventional methods. In order to obtain a better understanding of the biochemical and biophysical processes at the molecular level involving phospholipid bilayers, we apply molecular simulation methods to investigate the complexity of the membrane matrix using atomistic models. Here, we discuss molecular dynamics studies we have performed for a mixed phospholipid bilayer containing two of the most prevalent phospholipids (phosphatidylcholine and phosphatidylethanolamine) in biological membranes. We present structural and dynamics properties of these systems, as well as the effect of stabilizing agents, such as trehalose and DMSO, on their properties. The results from our simulations are the first step toward a better understanding of the diffusion of drugs and preservation of cellular systems.

#53 A Novel Methodology towards Fabrication of Porous Materials using Biological Agents and Nanoparticles: Fabrication, Characterization, Mathematics and Rheology

Navin Manjooran, Dr. Gary Pickrell
Materials Science and Engineering*

The porous material industry accounts for billions of US dollars in sales annually. Here, we discuss a novel method to make porous structures using nanoparticles and biological agents like fungi, bacteria, and viruses. The fabricated samples are characterized using an optical microscope and scanning electron microscope. A mathematical understanding of the van der Waals forces between nanoparticles and the biological agent are also derived. This understanding can help disperse nanoparticles and prevent them from agglomerating. Data on Rheology of the few samples during fabrication will be presented that helps understand their flow behavior. Statistical analysis of the data will be presented as well.

#54 Usability Assessment of Pictorial Toy Assembly Instructions for Young Children

Cortney Martin, Dr. Tonya L. Smith-Jackson
Industrial and Systems Engineering*

When assembly instructions are difficult to follow, users often believe the fault lies with them. For a child, this may be detrimental to their sense of self. However, there is little research on the design or evaluation of pictorial assembly instructions which are increasingly common among children's toys. This exploratory study, grounded in Cognitive Load Theory, evaluates five commercially-available toy and instruction sets with boys and girls ages 6 and 9 years. The instructions were comprehensively evaluated by measuring assembly performance, frequency and duration of instruction looks, subjective ratings, and usability problem frequency. The results revealed that boys, as compared to girls, and 9 year-olds, as compared to 6 year-olds, required fewer instruction looks of shorter duration for each correctly assembled part. There were significant differences among toys. For example, on average the Bionicle® required almost 20 times the number of instruction looks per part as compared to K'NEX®. Comparisons of usability problems and knowledge of graphic syntax revealed graphic perception and comprehension differences between the age groups. Higher ratings of fun were correlated with a lower number of instruction looks per correct part, providing incentive for designers to create instructions that are appropriate for their youngest users.

#55 Two-Craft Coulomb Formation Flying

Arun Natarajan, Dr. Hanspeter Schaub
Aerospace and Ocean Engineering*

In Coulomb formation flying, the electrostatic charge of spacecraft is varied by active emission of either negative electric charges (electrons) or positive electric charges (ions). The resulting changes in inter-spacecraft Coulomb forces are used to control the relative motion of the spacecraft. This novel concept of propellantless relative navigation control has many advantages over conventional thrusters like ion engines. For example, this method of propulsion requires essentially no consumables, requires very little electric power to operate (often less than 1 Watt), and can be controlled with a very high bandwidth (zero to maximum charge transition times are of the order of milli-seconds). Thus, this propulsion concept could enable high precision formation flying with separation distances ranging between 10-100 meters. It is also a very clean method of propulsion compared to ion engines, thereby avoiding the thruster plume contamination issue with neighboring satellites. A new application of the Coulomb propulsion concept is to use the electrostatic force to control the separation distance between two physically unconnected craft. Due to the similarities with using a tether cable to connect two craft, this concept is called a Coulomb tether formation. Scenarios with two spacecraft flying only dozens of meters apart are investigated.

#56 Metallic Flavor as a Result of Lipid Oxidation in Mouth Catalyzed by Metals

Pinar Omur, Dr. Andrea M. Dietrich
Civil and Environmental Engineering*

Quality and safety of drinking water is crucial for the success of water utilities and public health protection. Although the water is highly treated in the treatment plants, metal ions may be introduced to the water through pipe corrosion, and cause a dissatisfaction of the consumers. Hence it is essential to discover the mechanism of the metallic flavor generation when water is consumed. Our hypothesis is that the metallic flavor formation is not only due to the taste of metal ions in water but also due to production of metal-catalyzed odors in the mouth as a result of lipid oxidation of oral epithelial cell membranes that contain phospholipids. We have an interdisciplinary approach to understand the metallic flavor generation and perception with the following objectives, a) determine if lipid oxidation is responsible for generating a metallic flavor, b) determine the volatile compounds generated when metals get in contact with mouth tissue and saliva, c) study lipid oxidation of epithelial cells in vitro with and without saliva, and d) determine the effect of antioxidants on metallic flavor production/perception. Our preliminary results show that volatile compounds, aldehydes and ketones, are produced as contaminated water is consumed, supporting our hypothesis.

#57 Development of Performance Warranties for Performance-Based Road Maintenance Contracts

Mehmet Egemen Ozbek, Jesus M. de la Garza
Civil and Environmental Engineering*

Performance-based contracting in the transportation arena is a rather new concept, which has a few applications in the United States. The Virginia Department of Transportation (VDOT) has been one of the first state agencies that took the initiative of using a performance-based contract for the maintenance of a portion of its interstate highway system. This initiative led to the establishment of a contract between VDOT and a private contractor in 1996. Just like performance-based contracting, the use of warranties in highway construction contracts in the United States is quite a new concept which mainly dates back to 1995. There are different views possessed by different parties about the possible outcomes of implementing warranties in highway contracts. This research first explores the benefits that would/may be gained by the incorporation of warranty clauses into performance-based highway maintenance contracts and discusses the rationale behind developing warranty clauses for such contracts, and then develops a warranty clause template and proposes it to be used in the future performance-based road maintenance contracts issued by VDOT.

#58 Aerodynamics and Flow Enhancement of Trapezoidal Wings

Jose M Rullan, Dr. Demetri P. Telionis, Dr. Pavlos Vlacho
Engineering Science and Mechanics*

Wings swept by 30 to 40 degrees are today very common in military aircrafts, be manned or unmanned but with little understanding of the aerodynamics of such wings. The problem is that such wings may be able to sustain attached although broken down delta wing vortices, but stall like two-dimensional wings, shedding vortices with generators parallel to their leading edge. It is imperative that the basic aerodynamics of these phenomena is understood so the use of flow control techniques are attempted to improve their performance. Velocity and vorticity distributions along planes normal and parallel to the free stream as well as pressure distributions over the suction side of the wing have been studied. It has been found that close to the wing root the flow behaves like a delta wing vortex but farther from the root the flow field is separated like two-dimensional stall where vortices form and detach. Also, it has been found that by applying flow control the flow field is much better organized with a leading edge vortex periodically activated penetrating the separated flow field and emerging downstream of the trailing edge. There was also an enhancement of the wingtip vortex that will contribute to lift improvement.

#59 A Modeling Method for Conceptualizing Modular Product Families and Platforms

Asli Sahin, Janis P. Terpenny*

Industrial Systems Engineering

Product family planning is an emerging philosophy that calls for the planned development and deployment of families of related products. In product family planning, individual customization of products generally competes with the goal of maximizing family commonality. To support such a challenging design process, this research proposes a visual modeling method for abstracting and capturing of product family design knowledge from both management and engineering perspectives. It coordinates design information at multiple levels of abstraction using five design assets, including: engineering functions, engineering objects, module solution drivers, interfaces, and interactions. With the proposed approach, design teams can readily represent and communicate how multiple perspective-driven initiatives and engineering facts are converted into a set of products. It promises to provide immediate feedback on modularity decisions. Additionally, it facilitates a comprehensive, easy, fast and cheap exploration of module alternatives. This research is unique in terms of classifying and integrating product architecture knowledge into conceptualizing modular product families. Also, it can be incorporated with product family learning activities for both engineers and managers. In the end, all these contributions will leverage usage of product family thinking as a winning business strategy.

#60 A Dual-Actuator Load Frame for Mixed-mode Fracture Testing of Laminated or Adhesively Bonded Specimens

Hitendra Singh, Dr. David A Dillard*

Engineering Science and Mechanics

A unique research instrument, capable of providing an instantaneous and infinitely variable mode mix for fracture mechanics studies of adhesively bonded beam specimens, laminated composites, and other beam-like specimens, was developed with NSF support. A personal computer and digital controller enable precise actuator control and automated data acquisition. The pump is a standard hydraulic pump used on servohydraulic test systems. The innovative design allows one to produce any desired combination of in-plane mode mixity with a single standard specimen, such as advocated by ASTM D-3433 for the double cantilever beam (DCB) specimen. The flexibility in mode mixity is achieved through the use of two actuators driven by standard servo controllers, which may be independently operated at any desired amplitude and phase difference. Each actuator is equipped with a load cell and a linear variable displacement transducer (LVDT) to provide information necessary for quantitative evaluation of specimen behavior. The specimen is clamped at the bonded end, and loads are applied to the debonded end through appropriate endblocks attached to the adherends. To improve accuracy in measuring the crack length, a high resolution camera is used to view the propagating debond without interfering with the test. The ability to detect the location of crack tips with improved accuracy will significantly help to answer key science issues related to adhesive bonding. The advantages of the dual-actuator unit include the following: 1. Mode-mixity is infinitely variable from pure mode I through any mode mixity to pure mode II. 2. Data at various mode mixities can be obtained with a single specimen or specimen type, providing increased accuracy and convenience in determining mode mixity effects. 3. The unit is capable of conducting quasi-static, high rate (dynamic), and fatigue tests on specimens held in a controlled temperature chamber, or submersed in a liquid environment, as permitted by a horizontal axis machine. 4. The unit offers the potential to systematically characterize fracture envelopes for adhesives and composites for design purposes, and to develop technological insights for improving the performance and design of such materials. An improved understanding of crack path selection and the significant dependence of fracture energy on mode mixity will lead to improvements in adhesives, composite matrix materials, and the designs of structures using these materials.

#61 Numerical Simulation of Nanoscale Flow: A Molecular Dynamics Study of Drag

*Tim Sirk**

Mechanical Engineering

The design of pathogen biosensors may soon incorporate beads having a nanoscale diameter, thus making the drag force on a nanoscale sphere an important engineering problem. Flows at this small of a scale begin to appear “grainy” and may not always behave as a continuous fluid. Molecular dynamics provides an approach to determine drag forces in those nanoscale flows which cannot be described with continuum (Navier-Stokes) theory.

#62 Dynamic PEM Fuel Cell Model for Power Electronics Design with Temperature Consideration

Ken Stanton, Dr. Jason Lai*

Electrical Engineering

A dynamic model of a PEM fuel cell is developed for power electronics simulation. The model accounts for static losses of activation, ohmic, and concentration regions, and dynamic transients due to charge double layer and compressor delay. In this paper, study was given to the effect of temperature for its effects on the output voltage with respect to load on the fuel cell stack. Findings were analyzed and incorporated into the model based on testing with Ballard Nexa 1.2 kW PEM fuel cell unit. The model is developed for PSPICE, then tested and compared to experimental data from the Ballard fuel cell system.

#63 Embodied Data Objects: Tangible Interfaces to Information Appliances

Manas Tungare, Pardha S. Pyla, Vladimir Glina, Pradyut Bafna, Wenjie Zhang, Xiaoyan Yu,*

Umut Balli, Steve Harrison

Computer Science

This paper describes the idea of embodied data objects. Using this concept, everyday artifacts can be used to represent bits and bytes of active information. These data objects can be used to interact with information-appliance-like devices that provide specific services as dictated by the context of interaction. The inherent affordances of physical data objects are leveraged to make the interaction with these service-oriented devices intuitive and natural. We describe the idea of embodied data objects, followed by the design and implementation of two such service-oriented devices: a presentation projector and a printer.

#64 Optical Biosensor with a Micrometric Tip

Xingwei Wang, Xingwei Wang, Juncheng Xu, Zhuang Wang, Kristie L. Cooper, Anbo Wang*

Electrical and Computer Engineering

This paper presents a novel optical sensor structure with a micrometric diameter tip for biomedical applications. With the intrinsic fiber optic Fabry-Perot (FP) cavity inside the fiber, the change in optical path length distance (OPD) caused by the environment can be demodulated. With such a tiny protrusion, the sensor can be inserted into micron size cells for intracellular measurements. This label-free detection method is very useful in biological areas such as DNA hybridization detection. It provides a valuable tool for intracellular studies that have applications ranging from medicine to national security. Last but not the least, the structure shows great promise for reduction to nanometric size. Once this goal is achieved, the sensor can be inserted into most cells with minimal invasiveness.

#65 Passive Mechanical Properties of Maturing EDL are not Affected by a Lack of Dystrophin

Andrew V. Wolff, Ashley Niday, Kevin Voelker, Jarrod Call, Nick Evans, Dr. Kevin Granata,
Dr. Robert Grange
Mechanical Engineering*

Duchenne muscular dystrophy is an X-linked degenerative skeletal muscle disease characterized by the absence of the protein dystrophin from skeletal muscle cell membranes. To better understand the role that mechanical weakness might play in the onset of the disease, the mechanical properties of maturing dystrophic and control skeletal muscles should be systematically assessed. The purpose of this study was to determine (1) if the passive mechanical properties of maturing dystrophic muscles were different from control, and, (2) if different, when during maturation did these properties change? At ages prior to and following the overt onset of the dystrophic process (14-35 days), control and dystrophic extensor digitorum longus (EDL) muscles were subjected to two passive stretch protocols at 5% strain with two strain rates (instantaneous and 1.5 L0/s) in vitro. Force profiles at the instantaneous strain rate were fit to a three parameter viscoelastic muscle model to determine two parameters of stiffness and a damping parameter. The dystrophic and control EDL muscles exhibited similar passive mechanical properties at each age. These results suggest a functional threshold for dystrophic muscle below which damage may be minimized. Determining this threshold could have important clinical implications for treatments of muscular dystrophy involving physical activity.

Natural and Biological Sciences

#66 Myo-Inositol Oxygenase Is a Balance Point Between Signaling and Metabolism

Shannon Alford, Glenda Gillaspay
Biochemistry*

Myo-inositol is used in plants as a backbone of inositol phosphate and phosphatidylinositol phosphate signaling molecules. Myo-inositol is also a precursor for an alternative Vitamin C synthesis pathway in plants. The oxidation of myo-inositol by the enzyme Myo-Inositol Oxygenase (MIOX) produces D-glucuronic acid, which is further altered to produce Vitamin C. The Arabidopsis genome contains four genes predicted to encode MIOX enzymes. Recently it was shown that plants ectopically expressing the MIOX4 gene from Arabidopsis produced greater levels of Vitamin C. Since MIOX oxidizes myo-inositol, it could act as a regulator balancing the cell's needs for myo-inositol. We are interested in whether MIOX4+ plants contain alterations in inositol signaling. We found that MIOX4+ seedlings are hyposensitive to abscisic acid (ABA) in seedling germination. This suggests that MIOX4+ plants are altered in the ABA response pathway. Since ABA signaling has been shown to induce Ins(1,4,5)P3 synthesis, this response may indicate that MIOX4+ plants are compromised in their ability to synthesize Ins(1,4,5)P3. We are measuring myo-inositol levels by GC in MIOX4+ plants to determine if myo-inositol levels are altered. We are also measuring Ins(1,4,5)P3 levels in MIOX4+ plants. Our results will help us understand how MIOX function impacts myo-inositol metabolism and signaling.

#67 Geospatial Modeling of Forest Road Networks and their Impacts on Stream Macroinvertebrate Communities

Aaron M. Bernard, Dr. Stephen P. Prisley, Dr. W. Michael Aust, Dr. Conrad D. Heatwole
Forestry*

Road construction and maintenance throughout the country continues to be one of the largest contributors of sediment pollution to aquatic systems. Though impacts of road networks on aquatic systems can be potentially severe, little work has been performed to evaluate the effect that road spatial location within a watershed has on water quality. A quantitative "Road Impact Factor" protocol was designed to identify potential erosion-prone segments of road networks based on road gradient, spatial location based on hydrologic flow length, surface composition, and water control installations. The protocol was developed for two regions in Central Idaho and Eastern Oregon. We then used the hydrologic travel time procedure, developed for use in the Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) runoff and routing model, in order to characterize the spatial distribution of potential road runoff impacts within the study areas. Ten macroinvertebrate metrics sensitive to sedimentation were analyzed to test the significance of the spatial distribution of Road Impact Factors. These 10 metrics were analyzed under the hypothesis that values will be lower for those study areas that have a higher degree of road impact and a lower distance between the road segments and stream reaches.

#68 Managing the 'Commons' on Cadillac Mountain: A Stated Choice Analysis of Acadia National Park Visitors' Preferences

Steve Bullock, Steve Lawson
Forestry*

High levels of visitor use, depleting resource conditions, increasing management restrictions and site hardening on the summit of Cadillac Mountain, an Acadia National Park 'icon' site, may be considered an example of the "Tragedy of the Commons" (Dustin & McAvoy 1980, Hardin, 1968). Hardin's (1968) proposed solution to the Tragedy of the Commons, "mutually agreed upon coercion", is defined as "social arrangements that produce responsibility" which are "agreed upon by the majority of the people affected". This study uses stated choice analysis to assess the tradeoffs that Cadillac Mountain visitors are willing to make among public access, resource protection, visitor regulation, and site hardening. Results indicate that Cadillac Mountain visitors consider protecting vegetation and soils to be a priority, and indicate a willingness to accept restrictions requiring visitors to stay on the paved summit trail and management structures such as signs and rock borders placed along the trail. While respondents did support visitor regulations and some degree of site hardening to protect vegetation and soils on the mountain summit, respondents preferred that the park maintain relatively unlimited public access to the summit and not install fencing along the summit loop trail. In summary, the results suggest that visitors to Cadillac Mountain are not willing to accept a degraded "commons" and that "mutually agreed upon coercion" may exist in the form of limiting visitor freedoms onsite and moderate amounts of site hardening, but not in limiting the freedom to visit.

#69 Biplot Display: An Integrated Analysis of Transcript and Metabolite Profiles of *Medicago Truncatula*

*Hui Cheng**, Pedro Mendes, Bharat Mehrotra, Greg May, J. Tim Smith, Lloyd W. Sumner, Richard A. Dixon
Genetics Bioinformatics and Computational Biology

Integration of post-genome data obtained by transcriptome and metabolome is important for understanding of cell systems. Comprehensive and In-dept Visualization for exploring multivariate data will give insight into these transcript and metabolite profiles. The biplot is particularly useful for the display of these data as both the molecules and the sample conditions can be simultaneously plotted. Biplots can be seen as the multivariate analogue of scatter-plots: they give a graphical representation of a multivariate sample and they superimpose on the display a representation of the variables on which the sample is measured. Biplots are useful both in the data exploration and data description. In order to display multivariate data in a few dimensions, some data reduction technique needs to be applied to build the biplot. Singular value decomposition of the data matrix (PCA) is used to compute the coordinates of the plot. In this work, we apply biplot display to visualize gene expression data and the association between expression level and time obtained in a model legume, *Medicago truncatula*. We conduct integrated analysis of transcript and metabolite profiles. This visualization method will help us to identify novel genes and annotate existing genes of unknown function in the Leguminosae by association of their expression levels with metabolite identities.

#70 Wood-based Nanoparticles for Targeted Drug Delivery

*Shuping Dong**, Maren Roman
Department of Wood Science and Forest Products

This poster introduced the project goals, background, research strategy and current progresses. The purpose of the project is to identify and test the biomedical applications of wood-based cellulose nanocrystals, especially in the targeted drug delivery application in anticancer systems, and further to pursue high value-added specialty wood products. The strategy for our research project, includes the following aspects, labeling the cellulose nanocrystals with a fluorescent marker (fluorescein isothiocyanate--FITC), testing the hypothesis that cellulose nanocrystals are internalized by mammalian cells, and synthesizing targeted drugs with cellulose nanocrystals as drug carrier that release the drug inside the cell. The cellulose nanocrystals were made directly from cellulose by acid hydrolysis. The nanocrystal suspensions before (the white color bag) and after FITC labeled (the yellow color bag) were introduced with pictures. The sizes of the nanocrystals were investigated with atomic force microscopy (AFM). The AFM images showed that the FITC-labeled nanocrystals (after reactions) aggregated while the original nanocrystals (before reactions) dispersed well.

#71 Effect of Exogenous Corticosterone on Respiration in a Reptile

*Sarah DuRant**, William A. Hopkins, Larry G. Talent, L. Michael Romero
Fisheries and Wildlife Sciences

Glucocorticoids (GCs), or stress hormones, increase in animals after exposure to stressors and enable organisms to meet energy requirements by increasing metabolic activity (e.g. protein catabolism and gluconeogenesis). Increases in metabolism should translate to increases in whole animal metabolism, and therefore energy expenditures by organisms. Few studies have examined the effects of GCs on energy expenditure and have produced conflicting results, which could be attributable to species-specific differences, differences in methodology and the levels of GCs examined (physiological vs. pharmacological). We examined the affects of exogenous administration of corticosterone (CORT), the primary GC in reptiles, on metabolism in western fence lizards (*Sceloporus occidentalis*) by frequently measuring changes in respiration for 48 hours after dosing. Low levels of CORT resulted in plasma CORT concentrations similar to controls, however injections of 0.40µg/g of CORT produced a ten-fold increase in plasma CORT concentrations 3 hrs post dose. Interestingly, increases in respiration were also noted in the highest dose group during this time interval. Respiration rates were returning to baseline 6 hours after dosing which coincided with decreases in plasma CORT concentrations. Our results suggest that frequent measures of metabolism facilitates detection of subtle and dynamic changes in respiration caused by GCs that may be important for understanding the overall energetic implications of stress.

#72 Phylogenetic Analysis of the Genus Pistacia (Anacardiaceae)

Mohannad G.AL-Saghir, Prof Duncan Porter*

Biological Sciences

Pistacia L. (Anacardiaceae) is a genus of nine species and five subspecies according to the current study, which occur naturally from the Philippines to Mediterranean countries, and in Mexico and Texas. This genus is economically very important because it includes Pistachio (*Pistacia vera* L.), which has edible seeds of considerable commercial importance. Few systematic studies have been made on this important genus. At present, the most complete taxonomic study is that of Zohary (1952), who included 11 species in the genus and divided them into four sections. Based on chloroplast DNA profiles, Parfitt and Badenes (1997) subdivided the genus into two sections: *Terebinthus* and *Lentiscus*. Today, there are many questions about Zohary's and Parfitt and Badenes's taxonomic treatments, the status of many of the species, and the accuracy of dividing the genus into four sections or two sections. This disagreement is mainly because of little information being available on the phylogeny of the genus. Previous such studies are hampered by small sampling size, weak representation of the species, and poor resolution of the method used. Therefore, they have failed to resolve the relationships between species within the genus. Moreover, species of *Pistacia* easily form interspecific hybrids, suggesting close relationships which limit the previous studies and make the actual level of speciation and relationships within the genus unclear. A better understanding of these relationships is needed to make the species more useful for plant improvement or genetic studies. No molecular studies have been done to the whole genus. The goals of this project are to (1) evaluate the relationships within *Pistacia*, and (2) examine the relationships among *Pistacia* species and genomes to reconstruct a phylogenetic tree that will be used in providing a taxonomic treatment for this important genus. These goals were addressed by utilizing morphology, leaf anatomy, cytology and molecular data. We expect this study to yield important contributions to the taxonomy, genetics and breeding aspects of this economically important genus.

#73 Characterization of Two Arabidopsis Beta-Galactosidases

Dashzeveg Gantulga, Asim Esen, Yusuf Turan, David Bevan, Brenda Winkel*

Biological Science

In *Arabidopsis*, 17 putative β -galactosidases have been identified. Determination of catalytic properties, structure and biological functions of these different isoforms is the focus of my research. My hypothesis is that in plants these isoforms differ with respect to temporal and spatial regulation, and ability to hydrolyze different substrates. I will test my hypothesis by studying the substrate specificity and expression profiles of the different β -galactosidases isoforms that are subject of my research. *Arabidopsis thaliana* β -galactosidase-5 (At1g45130, β -Gal-5) and β -galactosidase-2 (At3g52840, β -Gal-2) cDNAs have been cloned and expressed in *Pichia pastoris*, yielding secreted recombinant proteins. Recombinant proteins were purified from culture supernatant by ion exchange chromatography and hydrophobic interaction chromatography. Both recombinant enzymes (β -Gal-5 and β -Gal-2) consisted of monomers with molecular mass of 79kD and 80 kD, respectively. Purified proteins hydrolyzed pNPGal, oNPGal, 4-MUGal, X-Gal and 6-BNGal, galactooligosaccharides and pNPFuc to a lesser extent. Both enzymes showed optimum activity at pH 4.5 and 40°C.

#74 Physical Fitness Attenuates Abdominal Visceral Fat Gain with Overfeeding

Christopher Gentile, Jeb Orr and Kevin P Davy, PhD*

Human Nutrition Foods and Exercise

Abdominal visceral fat (AVF) has been implicated in the development of type 2 diabetes and cardiovascular diseases. Little is currently known regarding the factors that contribute to the heterogeneity in AVF accumulation with weight gain, although physical fitness may play a role. We hypothesized that the increase in AVF with weight gain would be smaller in physically fit compared with sedentary individuals. Five physically fit and six sedentary (age=21±1 vs 26±2, BMI=24±1 vs 24±1, VO₂ max=51.0±1.3 vs 40.0±1.5) men were overfed by ~1000 kcals/d until a 5 kg weight gain was achieved. Maximal oxygen uptake (indirect calorimetry), total body fat (DEXA), and AVF (CT scans) were measured at baseline and following 4 weeks of weight stability at each individual's elevated body weight. Body weight increased similarly in the two groups (5.2±0.3 vs. 5.0±0.2 kg, p>0.05), whereas the increases in total body fat (3.3±0.95 vs 4.1±0.36 kg p<0.05) and AVF (5.4±4.8 vs 24.6±7.7 cm², p<0.05) were smaller in the physically fit individuals. These findings may have important implications for understanding why weight gain increases the risk of type 2 diabetes and cardiovascular disease.

#75 Effects of Prescribed Burning, Mechanical and Chemical Treatments to Curtail

Rhododendron Dominance and Reduce Urban Interface Fuel Loads

Chuck Harrell, Shep Zedaker*

Forest Biology

Rosebay Rhododendron (*Rhododendron maximum* L.) is an ericaceous shrub found to be increasing in abundance in the riparian areas of the Appalachian Mountains. In recent years Rhododendron has been observed growing out of its traditional wet site habitat and proliferating towards drier midslope and ridgetop areas. After a century of fire exclusion in this region, researchers and ecologists are beginning to see the negative effects of the dense understory rhododendron growth that has taken hold in the absence of fire. Two such negative effects are the stunted growth or absence of overstory tree regeneration and dangerous fuel conditions near suburban structures where rhododendron is commonly planted as an ornamental shrub. The expansion of rhododendron has been exacerbated by the cessation of cattle grazing in the mountains and the shift away from clearcutting on federal property. This study is aimed at determining the efficacy and efficiency of various vegetation control measures (and their combinations) on rhododendron including reintroducing fire to mountain ecosystems, mechanical thinning, and herbicide application. The results of the treatments from this study will be used over the long term to demonstrate to land managers the effects of vegetation control on rhododendron.

#76 Nanocrystal Immunotargeting of Chlorpyrifos-Mediated Vascular Inflammation

Anjali Hirani, Sungkwon Kang, Marion Ehrlich, Yong Woo Lee*

Biomedical Engineering and Sciences

Pro-inflammatory pathways in the brain microvasculature have been implicated in blood-brain barrier (BBB) disruption and the pathogenesis of neurodegenerative diseases. Our previous studies have demonstrated that exposure to the organophosphorus (OP) insecticide chlorpyrifos induces BBB disruption in an in vitro model of the BBB using co-cultures of primary rat astrocytes and brain microvascular endothelial cells (BMEC). Mechanisms of action underlying this process have not yet been clearly established. Additionally, only limited information is currently available on the direct effects of chlorpyrifos on the cerebrovascular endothelial cell function and BBB integrity. The present study was designed to elucidate the molecular mechanisms of chlorpyrifos-induced BBB disruption. In order to investigate the pro-inflammatory mechanisms of vascular injury by chlorpyrifos, expression of a variety of inflammatory mediators, such as pro-inflammatory cytokines, chemokines, adhesion molecules and matrix metalloproteinases was analyzed by quantitative real-time reverse transcriptase-polymerase chain reaction (RT-PCR). The data presented suggests that brain microvascular endothelial dysfunction and subsequent alterations in BBB integrity are induced by chlorpyrifos through pro-inflammatory pathways. It also offers the potential to contribute to the development of new therapeutic strategies specifically targeted against pro-inflammatory pathways of environmental agent-induced neurotoxicity.

#77 NF- κ B and Sustained JNK Activation are Essential for Long-term Arrest and Recovery of HEK293 Multicellular Aggregates

Graham Jack, M. Carla Cabrera, Jamie Garst, Rich Helm, Malcolm Potts
Biochemistry*

A wide variety of adherent human cells can be induced into a reversible state of metabolic arrest (quiescence) by conversion to non-adherent multicellular aggregates. This study describes the signaling events required for these "spheroids" to maintain a viable state at room temperature under oxygen and nutrient-deprived conditions for extended periods of time (weeks) as well as to convert back to adherent monolayers after long term arrest. The activated pathways for HEK293 spheroids were found to be dependent on both NF- κ B signaling and sustained JNK activation. A cyclical cascade, presumably originating from an intercellular stress signal, leads to endogenous cytokine production (TNF- α , IL-1 β and IL-8) and propagation of the cellular stress signal through the co-activation of both NF- κ B and JNK. Increased levels of known downstream pathway signaling members, specifically Gadd45b, c-jun and ATF3 were clearly observed as was the activation of c-jun (phosphorylation). The activation of these pathways allow these cells to survive long-term arrest and recovery as chemical inhibition of both NF- κ B nuclear translocation and JNK phosphorylation leads to significant cell death. This work appears to be the first example of sustained JNK activation working in cooperation with NF- κ B's transcriptional upregulation of downstream genes, permitting human cells to remain viable under a long term stress and recovery process. The observed responses may be related to the nature of signaling in multicellular aggregates and may be specific to HEK293 cells. Nonetheless, these studies indicate that the investigation of stress response pathways through monitoring both cytokines and proteins at endogenous levels, without reliance upon genetic engineering or exogenous addition of cytokines and/or chemokines is quite feasible. Furthermore, the multicellular aggregate model, may present a more "in vivo-like" response, providing new insights into the signal transduction cascades required for cells to survive specific stresses.

#78 Assessing Secondary Production of an Appalachian Stream Dwelling Snail During a Watershed Scale Riparian Zone Manipulation Experiment

Nicholas Jeremiah, Dr Fred Benfield
Department of Biological Sciences*

The objective of this study is to explore how logging practices influence secondary production of stream dwelling snails. Examining potential bottom up controls, i.e. sunlight, temperature, sediment load, and nutrients, we will assess primary and secondary production as a measure of system energy flow in four first order streams with different riparian buffer widths (reference, 0m, 10m and 30m buffer widths). Individual snails (*Goniobasis proxima*) have been measured and weighed monthly to assess biomass since June 2005. Snail secondary production will be estimated for the streams after one year using the size-frequency method. Snail density from June to December 2005 ranged from 0 - 220 snails/m² and size and weight varied from 0.65 - 6.5 mm and 0.15 - 235 mg, respectively. Average noontime light intensity and temperature from 23 Oct to 15 Dec 2005 was 57 lux and 7.4° C in the reference watershed compared to 591 lux and 16.4° C in the stream with the 10m riparian buffer width. We expect to see a higher rate of snail secondary production in streams draining cut watersheds relative to the reference watershed due to higher primary productivity stimulated by increased light and nutrient availability and higher stream temperature.

#79 Examining the Utility of Computer Simulation for Monitoring Multiple Dimensions of Wilderness Solitude in Great Smoky Mountains National Park

Brett Kiser, Steve Lawson
Forestry*

Findings from a recent study of hikers in Shenandoah National Park suggest that there may be multiple dimensions of encounters that influence the extent to which wilderness visitors experience solitude, and that indicators of wilderness solitude might be expanded to include the timing and location of encounters. Monitoring encounters in wilderness recreation areas through on-the-ground observation has proven to be difficult. Expanding the set of indicators of wilderness solitude to include spatial and temporal dimensions of encounters presents an even greater challenge for monitoring. The purpose of this study is to assess the utility of computer simulation modeling for monitoring multiple dimensions of inter-group encounters on a multi-use trail and backcountry campsite network in Great Smoky Mountains National Park. Study findings are expected to improve park managers' ability to assess the extent to which visitors have opportunities to experience wilderness solitude in the parks' backcountry and proposed wilderness.

#80 Structure-Function Relationships and Cellular Location of Archaeal-type Phosphoenolpyruvate Carboxylase

Jessica Kraszewski, Biswarup Mukhopadhyay
Biochemistry*

We have recently discovered a new form of phosphoenolpyruvate carboxylase in the archaea, which is structurally distinct from its plant and bacterial counterparts (Ppc). We have designated this new type of enzyme as archaeal-type phosphoenolpyruvate carboxylase (PpcA). PpcA is wide spread in the archaea, found in only three bacterial species and absent in the eukaryotes. One of our goals is to study structure-function relationships in PpcA. The distinct structure of PpcA makes it difficult to guide structure-function analysis of this enzyme with the available knowledge of Ppc. Therefore, we performed random mutagenesis analysis of ppcA to identify critical catalytic and regulatory residues of the enzyme. The crystal structure of PpcA is currently under determination. The combination of crystal structure and random mutagenesis data will increase our understanding of structure-function relationships in PpcA. For this work, PpcA from *C. perfringens*, a bacterium, was used as the model. Another goal is to study the physiological role of PpcA. We used *Methanosarcina acetivorans* and *Methanothermobacter thermoautotrophicus*, two methanogenic archaea, as models for this work. Preliminary data indicated that this enzyme is membrane associated. This property is unique because all Ppcs are soluble cytoplasmic proteins. We discuss the physiological implications of this finding.

#81 Kinetic Analysis of the Mechanism of the Cell Division Cycle in *Caulobacter Crescentus*

Shenghua Li, Paul Brazhnik, Bruno Sobral and John Tyson
Biological Sciences*

Progress in understanding cell cycle regulation in bacteria has lagged behind eukaryotes. Recently, however, the discovery of two master regulator proteins, CtrA and GcrA in *Caulobacter crescentus*, allows us to propose a realistic molecular mechanism for cell cycle control in this bacterium. The mechanism is cast in a quantitative model revealing the temporal dynamics of the genes and proteins regulating the cell cycle in *Caulobacter* wild type cells as well as in several mutants.

#82 The Long Term Effects of Phosphorus Fertilization on Soil Phosphorus Availability

Bradley Miller, Tom Fox*

Forestry

Phosphorus (P) is one of the most limiting nutrients in forest soils. Phosphorus fertilization increases plant available or "labile" P after fertilization, however it is uncertain how P fertilization influences organic and inorganic P pools over the long term in forest soils. The goal of this project is to determine the effects of P fertilization after twenty years in southeastern US. Soil samples were collected in loblolly pine plantations established on well- and poorly drained sandy and clay soils subjected to low and high intensity site preparation. Phosphorus pools were quantified using the Hedley sequential fractionation procedure. This procedure determined total P, labile P, moderately labile P, and recalcitrant P pools. Fertilization increased levels of total P regardless of site preparation intensity and drainage class compared to unfertilized soils. After twenty years, labile P pools remained significantly higher in fertilized plots compared to controls in sandy coastal plains soils. Results from this research will help our understanding on the long-term affects of forest fertilization prescriptions on P pools.

#83 Neuropsychological Effects of Hostility and Pain on Emotion Perception

Gina Mollet, David W. Harrison, Ph.D.*

Psychology

Neuropsychological theories of hostility suggest differences in cerebral lateralization in high and low hostile men during emotion perception and in response to cold pressor pain. In order to extend and replicate previous research, the current experiment examined auditory emotion perception before and after cold pressor pain in high and low hostile men. Additionally, quantitative electroencephalography (QEEG) was used to measure changes in cerebral activation as a result of cold pressor pain. Results indicated that identification of emotion post-cold pressor differed as a function of hostility level and ear. The high hostile group increased identification of stimuli at the right ear after cold pressor exposure, while the low hostile group increased identification of stimuli at the left ear after cold pressor exposure. Primary QEEG findings indicated increased left temporal activation after cold pressor exposure and increased reactivity to cold pressor pain in the high hostile group. Low hostile men had a bilateral increase in high beta magnitude at the temporal lobes and a bilateral increase in delta magnitude at the frontal lobes after the cold pressor. Results suggest decreased cerebral laterality and left hemisphere activation for emotional and pain processing in high hostile men.

#84 The Role of Eastern Hemlock in Organic Matter and Nutrient Dynamics in Headwater Streams

Kate Morkeski, J.E. Frank, J.R. Webster*

Biological Sciences

In the southern Appalachians, eastern hemlock is the only conifer that commonly occurs along streams. It is currently experiencing widespread mortality due to an introduced insect, and its functional elimination is expected. We hypothesize that eastern hemlock organic matter plays a unique role in headwater streams because the finely branched structure and decay resistance of its twigs make them singularly effective contributors to leaf retention. Since large detrital standing stocks are related to the rapid immobilization of dissolved nutrients, hemlocks may affect nutrient uptake and availability in streams. In September 2005 we added hemlock twigs to one stream and hardwood twigs to another and measured their effects relative to upstream reference reaches approximately monthly. Leaf transport distance was quantified using leaf analog releases, benthic organic matter standing stocks were measured, and ammonium uptake lengths were determined through solute co-injections.

#85 Sympathetic Neural Activation in Visceral Obesity in the Absence of Hyperleptinemia

Jeb Orr, Christopher Gentile, Guy Alvarez, Brenda Davy, Tasha Ballard, Stacy Beske, Kevin Davy*
Human Nutrition, Foods and Exercise

The results of studies in animal models of obesity suggest that the sympathoexcitatory action of leptin is preserved despite resistance to its anorectic effects (i.e., selective leptin resistance). However, we previously reported that muscle sympathetic nerve activity (MSNA) was similar in nonobese and subcutaneous obese individuals despite hyperleptinemia in the latter, arguing against the concept of selective leptin resistance in humans. To substantiate our previous findings, we tested the hypothesis that, in the face of similar leptin concentrations (via RIA), MSNA (via microneurography) would be increased in men with higher visceral fat (HVF, n=15, visceral fat=113±14cm²) compared with their age- (28±2 vs. 25±2 yrs, P<0.05) and total fat mass-matched (20.6±1.9 vs. 20.6±2.2 kg, P>0.05) peers with lower levels of visceral fat (LVF, n=15, visceral fat=70.6± cm²). Consistent with our hypothesis, MSNA was greater (33±4 vs. 21±2 bursts/min, P<0.05) in men with HVF compared with LVF even though plasma leptin concentrations were similar (5.7±0.8 vs. 5.5±1.1 ng/ml, P=0.91). In addition, there was no correlation between plasma leptin concentration and MSNA in the pooled sample (r=0.23, P=0.21). Taken together with our previous findings, these observations do not support the concept of selective leptin resistance in humans.

#86 An Innovative New Generation Vaccine Against Infectious Bovine Abortions.

Sheela Ramamoorthy, N. Sanakkayala, R. Vemulapalli, D. S.Lindsay R.Duncan, R. Kasimanickam, G. S. Schurig, S. M. Boyle, N. Sriranganathan*
Veterinary Medical Sciences

Brucella abortus and *Neospora caninum* are pathogens that cause bovine abortions and are a major economic concern to cattle industries worldwide. *B. abortus* strain RB51 is currently used as a live vaccine for bovine brucellosis. In this study, protective antigens of *N. caninum* that included MIC1, MIC3, GRA2, GRA6 and SRS2 were expressed in *B. abortus* strain RB51, which served as a vaccine delivery platform, to create recombinant vaccine strains. Each strain was inoculated intra-peritoneally in C57BL6 mice, followed by a booster dose four weeks later. When challenged with a lethal dose of *N. caninum* tachyzoites, all unvaccinated control mice died within seven days. Mice in the MIC1 and GRA6 groups were completely protected while the mice in the SRS2, GRA2 and MIC3 groups were partially protected. The recombinant vaccine's ability to prevent vertical transmission of *N. caninum* in mice was assessed. Mice vaccinated using the same protocol were bred a week after the booster and challenged with 5x10⁶ *N. caninum* tachyzoites between day 12 – 14 of pregnancy. Brain tissue was collected from pups three weeks after birth and analyzed for the presence of *N. caninum* by PCR. Protection against vertical transmission in the MIC1, MIC3, GRA6, GRA2 and SRS2 groups was 18%, 38%, 43%, 34% and 7% respectively. The MIC3, GRA6 and GRA2 groups were significantly different from the unvaccinated mice. The potent immune responses that are generated upon vaccination of mice with the recombinant vaccine indicated that this study might be a promising approach towards development of a multivalent vaccine for Brucellosis and Neosporosis.

#87 Structural Modeling of Arabidopsis thaliana 5-phosphatase1, 5-phosphatase11 and Spsynaptojanin

Natasha Safaee, Glenda Gillaspay
Biochemistry*

Phosphatidyl inositol phosphates and inositol phosphates function as second messengers in inositol signaling pathways. One such second messenger, Ins(1,4,5)P₃ has been shown to signal an increase in cellular calcium concentrations leading to such physiological responses as stomatal closure and inhibition of germination. Inositol polyphosphate 5-phosphatases (5PTase) comprise a protein family of 15 phosphatases in Arabidopsis. We have previously shown in vitro and in vivo that At5PTase1 is able to hydrolyze water soluble substrates, InsP₂ and InsP₃. Observations from structural models presented here agree with these results. It is possible that a "finger" projection of At5PTase1 produces steric interference, causing binding to a lipid membrane unlikely. In addition, the theoretical binding surface of At5PTase1 does not contain a large concentration of positive or hydrophobic residues which would aid in membrane association. Unlike At5PTase1, At5PTase11 has a binding surface that is considerably flat and contains a high concentration of positive residues. This suggests that At5PTase11 can accommodate a lipid substrate by associating with negatively charged lipid head groups. These results support previous in vitro experiments that show that At5PTase11 does not hydrolyze a water soluble substrate but catalyzes the hydrolysis of PtdIns(4,5)P₂, PtdIns(3,5)P₂ and PtdIns(3,4,5)P₃.

#88 Detecting Avian Predation on Bivalve Death Assemblages using Indirect Methods

Jennifer Stempien
Geosciences*

Modern ecological studies suggest avian predation has significant ecological impacts on intertidal communities and can potentially alter the preservation of the subfossil record. To assess if bird predation can affect surficial mollusk deposits, life and death shell assemblages from lagoon, bar and gravel bar habitats known for bird predation on San Juan Island, WA were compared to a null model derived from the ecological literature: (1) minimal physical decay, (2) high shell fragmentation, (3) ubiquity of distinct fracture patterns, and (4) monospecific composition. In contrast to the highly degraded shells from the bay and lagoon, the gravel bar death assemblage displayed highly fragmented pristine shells, frequent presence (68%) of ligaments, a dominant (72%) of valve fracture pattern, and nearly monospecific composition. While overall fidelity between life and death assemblages was low, the similarities between the gravel bar death assemblage and life assemblages suggest the gravel bar approximates present day composition of the local mollusk fauna ecosystem better than either the bay or lagoon death assemblages. These results suggest bird predation can be identified indirectly using supratidal shell deposits, an attractive ecological tool for limited field observations, and the potential paleoecological perspectives of studying shell accumulations generated by molluscivorous birds.

#89 *Sacchromyces cerevisiae* Stress Response to Cumene Hydroperoxide: Proteomics Approach

Leepika Tuli, Dr. Vladimir Shulaev*

Virginia Bioinformatics Institute

Oxidative stress has been associated with several human diseases including cancer, autoimmune disease, and aging. It is defined as the state of disturbed intracellular redox balance. Reactive oxygen species generated during the time of respiration and oxidation of nutrients attack cell components like DNA, lipid membrane and protein. Lately, the oxidative stress response in many organisms was studied on a genomic scale using high throughput profiling methodologies. In *S. cerevisiae* oxidative stress is sensed through redox state of key proteins. Changes in the intracellular redox environment are reflected in the modifications of amino acids which in return act as sensor for oxidative stress. Our study aims to identify effector molecules (proteins) involved in oxidative stress response of *S. cerevisiae* to cumene hydroperoxide at different time points. Currently a combination of refined techniques encompasses proteomics: gel electrophoresis, image analysis, mass spectrometry and bioinformatics tools. However, the outcome of the research is influenced by the two key steps: 1) Separation of complex protein mixtures (commonly by 2D gel) and 2) Identification (by mass spectrometry). We have studied the effect of protein extraction, separation and visualization techniques on the total amount and complexity of the proteins that can be extracted and identified from yeast cells. Comparison results for two extraction protocols (RIPA buffer and Yeast Protein Extraction Kit), four staining methods (Coomassie, Silver, Flamingo Pink and Sypro Ruby stains), in conjunction with protein identification by LC-MS will be presented.

#90 The Effects of Fertilization on Heterotrophic, Autotrophic, and Total Soil CO₂ Efflux in a Two-Year-Old Loblolly Pine (*Pinus taeda* L.) Clonal Plantation on the Virginia Piedmont

Michael Tyree, Nathan T. King, John Seiler, and Thomas Fox*

Forestry

Fertilization is a common, cost effective method to increase forest productivity within managed forests of the southeastern United States. A thorough understanding of below-ground carbon dynamics is necessary for the estimation of net ecosystem productivity and the carbon storage potential of these managed systems. However, little is known about how fertilization will affect the below-ground processes that drive soil CO₂ efflux. The objective of this research was to determine how total soil CO₂ efflux (*FS*), and the respiratory components that make it up, respond over the first year following fertilization in six different *Pinus taeda* L. clones. In April 2004, we began monitoring *FC*, heterotrophic respiration (*RH*), and specific root respiration (*RR*) in response to fertilization with diammonium phosphate (*DAP*). Respiratory components were measured repeatedly throughout the year following fertilization using a dynamic closed chamber and an infrared gas analyzer. We found that both *FS* and *RH* differed significantly ($P < 0.0001$ and $P = 0.0002$, respectively) between fertilized and unfertilized plots, but the direction was dependent on date. Specific root respiration was significantly ($P = 0.0597$) increased in fertilized plots (+ 20%) when averaged over the entire study. We concluded that if the trends we observed in the first year continue, in the long-term, increased carbon storage on site may result due to greater plant biomass (carbon inputs) and decreased rates of decomposition in response to fertilization.

#91 Gender Differences in Energy Intake Regulation

Emily Van Walleghen, Brenda Davy, Jeb Orr
Human Nutrition, Foods and Exercise*

While aging diminishes the ability of men to regulate food intake, potential gender differences in energy intake regulation have not been addressed. We hypothesized energy intake compensation is greater in males (ie, more accurate energy intake regulation) than females, and gender differences are influenced by age. Forty-one participants were assigned to one of four groups: young males (YM) (n=14, age: 26+1 yrs), young females (YF) (n=12, age: 23+1 yrs), older males (OM) (n=7, age: 68+3 yrs), older females (OF) (n=8, age: 69+2 yrs). Thirty minutes prior to each of two meals, subjects consumed either a yogurt preload beverage (YP, 360 kcals, females, 475 kcals, males), or no preload (NP) (control). Percent compensation (PC) was defined as NP kcals consumed divided by YP kcals consumed (preload + meal kcals) multiplied by 100. There was a significant gender difference in compensation (PC: 81+4%, males, 68+4%, females, $P<0.05$). While there was no gender difference among younger subjects (PC: 83+5%, males, 73+5%, females, $P>0.05$), we found a significant difference between older males and females (PC: 77+4%, males, 60+5%, females, $P<0.05$). These results indicate gender differences in energy intake regulation become more pronounced with age and suggest older women may be prone to overeating.

#92 Nanoparticulate Cellulose-Chitosan Polyelectrolyte Complex for Controlled Release Applications in Food Matrices

Hezhong Wang, Susan Duncan, Maren Roman
Wood Science and Forest Products*

An inexpensive, versatile, nontoxic system that can provide swelling-controlled release of functional micronutrients and bioactive compounds in food matrices will be studied. This novel controlled system is a non-stoichiometric polyelectrolyte complex (N-PEC) of negatively charged cellulose nanocrystals and positively charged chitosan molecules. The effects of chitosan molecular weight, ambient pH and ionic strength on the properties of the cellulose-chitosan complex particles, including size and swelling kinetics will be investigated.

#93 Importance of IFN-Gamma in Recruitment of CD8⁺ T Cells into the Brain during Chronic Infection with Toxoplasma Gondii in Mice

Xisheng Wang, Yasuhiro Suzuki
Biomedical Sciences & Pathobiology*

IFN- γ and T cells, especially CD8⁺ T cells, are both required for maintaining the latency of chronic infection with *T. gondii* in the brain. We examined whether IFN- γ plays an important role in T cell recruitment into the brain using IFN- γ knockout (IFN- $\gamma^{-/-}$) and wild-type (WT) mice chronically infected with the parasite. Numbers of CD8⁺ T cells recruited into the brain were significantly less in infected IFN- $\gamma^{-/-}$ than WT mice, but this was not the case in CD4⁺ T cells. Adoptive transfer of CFSE-labeled immune spleen cells from infected WT mice into infected IFN- $\gamma^{-/-}$ and WT animals demonstrated that numbers of CFSE⁺ CD8⁺ T cells recruited into the brain were significantly less in IFN- $\gamma^{-/-}$ than WT mice, confirming an impaired recruitment of CD8⁺ T cells in IFN- $\gamma^{-/-}$ animals. Analysis of adhesion molecules expressed on the T cells recruited into the brain revealed that almost all CD8⁺ T cells were LFA-1⁺ and CD44^{high}. These results indicate that IFN- γ plays an important role in recruitment of CD8⁺ T cells into the brain during the chronic stage of infection. LFA-1 and CD44 expressed on the T cells may play an important role in this cell infiltration process although other adhesion molecules could also be involved.

#94 Effects of Ammonium Perchlorate on Thyroid Function and Baseline Plasma Corticosterone in Adult Japanese Quail

Eric Weigel, Dr. F.M. Anne McNabb, Dr. Ignacio T. Moore*
Department of Biology

Ingestion of AP has been shown to inhibit the thyroid gland(s) production of the thyroid hormones (TH's), triiodothyronine (T3) and thyroxine (T4) in various species, including humans. Thyroid inhibition has also been associated with decreases in circulating corticosterone in rats. In this experiment, the effects of varying doses of AP on thyroid function and circulating corticosterone in Japanese quail were investigated. I hypothesized that thyroidal production and storage of TH's would decline in a dose-dependent fashion with increasing AP treatment levels, and that baseline corticosterone would decrease as well. To test these hypotheses, AP treatment (six groups: 0 (control), 100, 250, 500, 1000, and 2000 mg AP/L in drinking water) was administered for two weeks, after which blood samples were taken and birds were sacrificed. Thyroid function was assessed by T4 and T3 levels in thyroid glands, T4 levels in plasma, and by thyroid gland masses. In male birds, thyroidal T4 declined with increasing AP treatment, and thyroid gland size increased, as expected. However, females did not respond significantly to any level of AP treatment. This surprising variation in response between sexes has not been previously observed for this chemical. Some of the AP ingested by females may end up in their eggs instead of their thyroid glands.

Physical Sciences

#95 Classical-Trajectory Study of Mass Effects on the Dynamics of Rare Gas Collisions with Self-Assembled Monolayers

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Chemistry

We present a classical-trajectory study of energy transfer in collisions of rare gas atoms (Ar, Kr) with self-assembled monolayers (SAMs) composed of methyl- (H-SAM) and fluorine-terminated (F-SAM) dodecanethiols to investigate mass effects on scattering dynamics. Through our simulations, we probe the microscopic mechanisms responsible for energy transfer in these systems. The effects of mass on the scattered atom's product translational energy distributions, final polar and azimuthal angles, and ability to penetrate or trap in/on the surface are examined. Energy transfer from the Ar to the SAM is substantially decreased when moving from the H-SAM to the more massive F-SAM. However, this trend does not scale proportionally for Kr impinging on the same SAMs. This is contrary to predictions of simple surface scattering models, such as the hard cube model, which are based on effective mass interactions. Remarkably, our results, which give semi-quantitative agreement with recent molecular beam experiments, seem to imply that, for these systems, the effective surface mass is greatly dependent upon the mass of the colliding species. We have shown evidence to discount the viability of alternate explanations (i.e. polarization of the impinging gas due to dipole interaction with the SAM) for this behavior.

#96 Bioreduction Kinetics of Hematite Nanoparticles by *Shewanella Oneidensis* MR-1: Effect of Size, Shape and Mineralogy

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David W. Kennedy and Dave McCready
Geosciences

Nanoparticles involved in interfacial geochemical reactions show different properties than bulk particles and their reactivity is predicted to change as a function of their size. However, no previous work has been performed to characterize the change in reactivity of these nanoparticles in bacterial bioreduction. We have compared the surface area normalized reduction rates of six hematite nanoparticles by reactor grown *Shewanella oneidensis* MR-1 under batch conditions with lactate as the sole electron donor. The hematite surface area to bacterial surface area per ml of assay volume was kept constant so that the interfacial area between the cells and the nanoparticles was nominally the same for all particle sizes. All treatments were repeated in triplicate and cell-free blanks were included. Vials were removed at selected time points for HCl extractable total Fe(II) determination by ferrozine. The plot of surface area normalized reduction rates ($\text{mM g m}^{-2} \text{hr}^{-1}$) as a function of particle size (nm) show the 10, 12, 16 and 99nm particles having increasing reduction rates with increasing particle size that approached a plateau at 99nm, while the 30 and 44nm plotted closely together. More bioreduction experiments with ferrihydrite, maghemite/magnetite and vernadite nanoparticles are planned for the future.

#97 Invertibility of Matrices over Subrings

*Mark Grinshpon**
Mathematics

Given a ring S and its subring R , we can consider the division closure $DC(R,S)$ and the rational closure $RC(R,S)$ of R in S . If S is commutative, then both $DC(R,S)$ and $RC(R,S)$ look like the classical ring of quotients of R (inside S). We show that this is also true if we assume only that R is commutative. The main obstacle to overcome is the absence of (classical) determinants, which in general can be well-defined only for matrices over commutative rings.

#98 Are all Curves Created Equal? Statistical Analysis of Curves via Profile Monitoring

*Willis Jensen**, Jeffrey B. Birch
Statistics

Profile monitoring is a relatively new technique in quality control best used when the process data follow a profile (or curve) at each time period. The essential idea is to model the profile via some parametric method and then monitor the estimated parameters over time to determine if there have been changes in the profiles. Because the estimated parameters may be correlated, it is convenient to monitor them using a multivariate control method such as the T^2 statistic. Previous modeling methods have fitted parametric models to each profile separately and ignored the correlation structure within the profiles. We propose the use of mixed models to model linear profiles in order to account for the random effects and correlation structure within a profile.

#99 Silicone Magnetic Fluids for Use in Eye Surgery

*Olin Thompson Mefford**, J. D. Goff, R. C. Woodward, T. G. St. Pierre, R. M. Davis, J. P. Dailey, and J. S. Riffle
Chemistry

We have worked for several years to develop biocompatible polysiloxane ferrofluids to treat retinal detachment. Retinal detachment is a leading cause of blindness, resulting in partial or complete loss of vision for several million people worldwide. Current available treatments fail in as many as one third of retinal detachment patients. This work aims to close holes in the retina with droplets of ferrofluid, preventing further fluid flow into the sub-retinal space, and allowing for retinal reattachment.

#100 Thermal Studies of Poly(L-lactic acid) Single Molecule Helices Patterned on Solid

Substrates

Suolong Ni, Woojin Lee, Melinda K. Ferguson-McPherson, John R. Morris, Alan R. Esker*
Chemistry

Previous studies of poly(L-lactic acid) (PLLA) Langmuir films reveal that PLLA molecules behave like rigid rods in a 10_3 helical conformation over the entire length of the chain, leading to lamellar morphologies in Langmuir-Blodgett (LB) films prepared from monolayers at the air/water interface. Thermal studies on PLLA LB-films with well-ordered lamellar features revealed: (1) Annealing PLLA LB-films at bulk crystallization temperatures (104 °C) does not change the helical conformation; however, the lamellar patterns disappear and three-dimensional (3D) crystals form; and (2) Melting the film at 200 °C followed by fast cooling destroys the lamellar surface morphology with dramatic changes in the fraction of the molecules existing in a helical conformation. These studies suggest that PLLA LB-films have a melting point below 104 °C, and two processes may be involved when PLLA LB-films are annealed at 104 °C: (i) melting of PLLA LB-films, and (ii) recrystallization of the PLLA melt. This idea is supported by differential scanning calorimetry measurements that show two endothermic regions at ~40-80 °C and 175 °C. Furthermore, in-situ atomic force microscopy (AFM) supports this interpretation by imaging the melting of PLLA LB-films at around 60 °C. 3D PLLA crystals are formed with increasing temperature and time.

#101 The “syn-pentane –like” Effect of 2,6-Disubstituted Aromatic Rings on Acyclic Conformation

Yiqun Zhang, Paul Carlier, and Carla Slebodnick*
Chemistry

Conformational control of flexible molecules is a challenging but technologically important goal. The discovery of previously unrecognized means of controlling acyclic conformation is therefore noteworthy. Compound syn- and anti-1 (3-hydroxy-2-mesityl-2-(2'-naphthyl)-propyl nitrile), prepared by nitrile aldol reaction, both possess vicinal coupling constants (J_{23}) of greater than 9.3 Hz. The coupling constant for syn-1 indicates that it adopts the expected fully extended conformation with a near 180° orientation of the mesityl and 2-naphthyl groups. However, in anti-1, J_{23} indicates that these groups adopt a gauche relationship. X-ray crystallography confirmed that this conformation is retained in the solid state. Computational studies were used to understand the different conformational preferences of syn- and anti- 1. We found that a “syn-pentane –like” effect operates in 1, which causes anti-1 to adopt the folded conformation A-Gauche rather than the anticipated fully extended conformation B-antiperiplanar. This “syn-pentane –like” effect was also found in other molecules with 2,6-disubstituted aromatic rings.

Social Sciences and Humanities

#102 Spanish for the Agricultural Industry

Ryan Anderson, John H “Rusty” Miller, Marshall R. Swafford, Shawn M. Anderson*
Career and Technical Education

The fastest growing agricultural sector in the United States is the horticultural/Green Industry. The largest labor force within the Green industry is of Hispanic descent. The course “Spanish for the Agricultural Industry” provides secondary agricultural students with the basic Spanish language transition skills needed in order to communicate effectively with Hispanic employees. The course objectives are:

- The secondary student will be able to write using the Spanish vocabulary with the appropriate sentence structure as related to commuting with the Hispanic workforce in the Agricultural Industries.
- Demonstrate the secondary student’s ability to orally communicate in Spanish including the ability to comprehend and form simple sentences, execute simple requests, and make simple statements pertaining to the essential job skills performed by Hispanic workers.
- Demonstrate the secondary student’s ability to use Spanish for basic language functions such as introductions, expressing gratitude, training new workers and communicating essential job performance tasks.

#103 The Nature and Extent of Desktop Graffiti Among US College Students: An Exploratory Study

*Daisy Ball**

Sociology

This study investigates classroom graffiti by US college students. The data were collected in nine classrooms randomly selected from two buildings at a major land grant university. In all, 1,758 examples of identifiable graffiti were collected and analyzed from 419 desktops. These graffiti are analyzed in order to gauge what some of the pressing issues are for students, and are useful in informing the university of what issues are most important to those students who engage in this activity. The findings suggest a strong interest in four main areas: sex, the University, drugs, and Greek organizations. One pattern that stands out is the large amount of graffiti of an anti-homosexual nature. Notable in its absence is virtually any student graffiti of a racist nature.

#104 African American Undergraduate Students' Experiences in Residential Learning Communities at a Predominantly White Institution

*Julia Best**

Teaching and Learning

Predominantly White institutions (PWIs) establish diversity initiatives to address a decline in enrollment and retention for African American students. They also establish residential learning communities (RLCs) to enhance educational experiences of undergraduate students. *Research Question: How do African American undergraduate students in RLCs perceive the role of these communities, particularly the kinds of contacts they afford with faculty, staff, and peers, in shaping their educational development?* I used qualitative methods – open-ended interviews, observations, and a questionnaire – to explore students' experiences in six academically-tied RLCs. Thirty-two members participated in individual interviews. Consistent with Astin's (1985, 1993b 1996) work, this study suggests that student involvement is necessary for retention. However, this study argues that a critical race theory perspective is needed to frame peer interactions that create racial barriers. A number of RLC components create positive affective and cognitive developmental experiences: (1) A sense of belonging and a sense of community significantly impact psychosocial wellbeing, success and retention; (2) Built-in support systems, educational advantages and personalized experiences at a large PWI are reasons to recommend RLCs; and (3) RLCs can contribute to existing outreach efforts into untapped in-state and out-of-state communities, school systems and outreach efforts on campus.

#105 Parent-Child Discourse about Helping

Sarah Holland Brown, Samantha W.F. Snyder, Rondeesha Lewis*

Psychology

The purpose of this exploration was to examine parent-child discourse about decisions to help, and not to help. Fifteen third-grade children and their parent engaged in a structured conversation with another parent-child dyad. The conversations were coded by three trained coders. The coding scheme focused on characterizing the familiarity of the victim to the participant, the context in which the victim found himself/herself in need of help, and the type of responses, if any, the participant received from the other members of the conversation after describing the event. Reliability was good (all Kappas > .7). ANOVA's showed that girls were more likely to receive approval for their verbal recollections of helping behaviors than were boys. Boys were more likely than girls to receive no response (either approval or disapproval) for their discussions of helping behaviors. Parents responded that their decisions to help others were based on situational cues while children based their helping on satisfaction and a feeling of social reciprocity.

#106 Framing Romanian Journalists' Kidnapping in Iraq: Media Frame Comparisons between Online Newspaper Coverage and Reader Discussion Posts

Ana R. Constantinescu, Dr. John C. Tedesco
Communication*

In late March 2005, three Romanian journalists were kidnapped by an obscure group of Iraqi militants near Baghdad. Several unusual details about the circumstances of the kidnapping prompted the Romanian media to investigate the speculation regarding the authenticity and motives of this high profile case. This thesis project extends framing theory to incorporate macro-level frames such as cynicism, speculation and metacommunication as dominant reporting styles in this evolving democracy. A systematic content analysis of 255 news stories from *Evenimentul Zilei* and *Jurnalul National* was performed. Additionally, 2,941 of their subsequent online reader discussion posts were analyzed along the same categories as the news stories to serve as a point of comparison between media reports and public discussion about this bizarre case. Results support evidence of generic media framing and extend the theory to demonstrate media's reliance on speculation and metacommunication as overarching reporting styles. Online deliberation between readers in this evolving democracy demonstrates difficulties in citizens' abilities to emerge from the spiral of cynicism characteristic of the post-communist Romania. Also, the results suggest that while media establish the issues for public dialogue, they do not appear responsible for setting the tone.

#107 The Relationship of Preferences and Self-Regulation Among Consistent Exercisers

Ashley E Dorough, Richard A Winett, PhD, Eileen S Anderson, EdD, Janet Wojcik, PhD
Psychology*

Physical activity is fundamental to health, yet only a small percentage of the population meets minimal guidelines and few programs have shown long-term maintenance of behavior change. Previous research has primarily sampled minimally physically active and sedentary individuals. In turn, studies focused on correlates of and perceived barriers to minimal physical activity (PA). The present study focused on exercisers (N=247, mean age=34) to assess social cognitive variables associated with PA consistency. Participants were categorized as either inconsistent, or slightly, fairly, or highly consistent exercisers. A new preference construct (type of activity, environment, social setting, feedback) for exercise was developed, and its association with consistency was assessed. Online measures assessed PA levels, preferences, enjoyment, outcome expectancy, self-efficacy, and self-regulation associated with PA. Higher confidence and frequency of self-regulatory behaviors (i.e. planning, goal-setting, and tracking) was associated with higher levels of PA consistency. Engaging in PA in one's preferred environment or with preferred company was higher among more consistent exercisers. Using strategies to offset perceived barriers to exercise was also highly predictive of consistency. Results suggest interventions should assess and match people to PA preference dimensions (i.e. environment, company, and self-regulation strategies) which will increase their self-regulation and ultimately exercise consistency.

#108 An Examination of the Consequences of Work-Family Conflict

Patrice Esson, John J. Donovan
Psychology*

Work-Family Conflict occurs when the demands of one's work diminishes one's ability to successfully meet the demands of one's family (Greenhaus & Beutell, 1985). Work, non-work, and stress-related consequences of work-family conflict were examined in a sample of 181 high school teachers. The results of this study indicated that work-family conflict was associated with higher levels of job and life stress, which in turn were significantly related to job attitudes (job satisfaction, organizational commitment, job burnout), intentions to quit, and overall life satisfaction. Additional analyses suggested that there may be substantial spillover across work and non-work domains with respect to stress and attitudes. Implications of these findings, as well as directions for future research are discussed.

#109 Adverse Impact: Four-Fifths Rule Versus Statistical Significance Tests in Courtrooms

Patrice Esson, Neil Hauenstein*

Psychology

In determining whether discriminatory practices (adverse impact) exists in the selection and/or promotion rates of employees in organizations, human resource managers, leaders of organizations, and judges have long depended on the use of the four-fifths or eighty percent rule. However, this method has been widely criticized and, in recent times more statistically savvy alternatives of determining adverse impact such as the use of significance tests have been implemented. This study examined the use of the four-fifths rule as compared to significance tests to establish prima facie evidence of adverse impact in courtrooms. Results indicated that minorities are more likely to establish the prima facie case and win cases using statistical significant testing instead of the four-fifths rule. The implications of these findings are discussed and suggestions have been made for future research.

#110 Two Sides of the Same Coin: Politics and Science in Karl Popper's Thought

*Michael Ferranti**

Political Science

In this paper, I put forward a series of conjectures designed to highlight the common character of Karl Popper's social and scientific thought with the hope of convincing the reader that Popper's life and writing support an interpretation of him as a LIBERAL philosopher of science as much as they do an interpretation of him as a liberal PHILOSOPHER OF SCIENCE. This argument, however, is not ad hominem. I do not attempt to show how Popper's philosophy of science is somehow marred by his social philosophy, or how political concerns obscure critical thinking and thus make Popper's scientific thought cheap or paltry. As is shown, a reading of Popper's philosophy of science as impure, and thus less "true," given its socio-political origins is spurious and I show only how there are indeed connections between Popper's political and social thought and that his political consciousness can be seen even in his 'pure' philosophy. To do this, I posit three main conjectures. First, Karl Popper's fallibilist epistemology acts as a prophylaxis against totalizing social schemes. Second, the principle of falsification plays as crucial a role in Popper's social thought as it does in his scientific thought. And finally, when Popper 'solved' the problem of induction by showing that it played no part in the scientific process, he did so in response to the problems of historical prophesy as much as in response to the problem of philosophic uncertainty.

#111 Using SJTs to Evaluate Equal Opportunity and Diversity Training Programs

Rolanda Findlay, Neil Hauenstein, Patrice Esson, Julie Kalanick*

Industrial and Organizational Psychology

There are many challenges that are associated with the evaluation of the effectiveness of most training programs. In the present study, we discuss the inadequacies associated with currently used methods for evaluating diversity training outcomes within the context of organizational effectiveness. We suggest Situational Judgment Tests (SJT) as a viable, more comprehensive, and credible evaluation alternative. This study addresses the construction of a SJT as well as the associated methodological challenges. Results indicated that SJTs have the potential to be a valuable tool in the assessment of the effectiveness of diversity training programs. These findings are discussed below and suggestions for future research have been made.

#112 The Interactive Roles of Parental Rejection and Noradrenergic Activation on Aggression in At-Risk Youth

Sara Chiara Haden, Angela Scarpa
Psychology*

Models of aggressive behavior posit that the propensity for aggressive behavior depends on the interaction between one's neurobiology and environment. The goal of this research was to consider the interactive effects of noradrenergic activation (i.e., a metabolite of norepinephrine, 3-methoxy-4-hydroxyphenylglycol [MHPG]) and childhood maltreatment on aggressive behavior in at-risk youth. It was predicted that baseline levels of MHPG would moderate the relationship between parental neglect and aggression. Fifty-five "at risk" male youth ranging from 7 to 17 years of age ($M=12.44$) were recruited from disadvantaged neighborhoods and completed the Assessing Environments III and Proactive and Reactive Aggression Scale surveys measuring parental neglect and total aggression, respectively. Salivary measures of MHPG were collected. A hierarchical regression was conducted in order to examine the direct and interactive effects of parental neglect and baseline MHPG on aggression and a significant effect was found for the interaction term, $\beta=37$, $F(4,54)=2.27$, $p=.03$. The relationship between parental neglect and high baseline MHPG was stronger, predicting higher aggression levels. Findings underscore the importance of examining the interactive effects of biological and environmental factors on aggression. In particular, the results suggest that lower noradrenergic activation may serve as a protective factor for aggression in neglected children.

#113 Gender Differences in Self Construal in Middle Childhood

Pa Her, Jessica Markowitz and Christie Weaver
Psychology*

Research demonstrates gender differences in self-construal among adults, with women describing themselves as more interdependent and connected with others compared to men, who describe themselves as more independent and autonomous (Cross & Madson, 1997). These differences are thought to emerge early in childhood through socialization process that continue in adulthood. We assessed gender differences in children's independent and interdependent self-construals with forty 9- to 10-year-old children (50% girls) who were interviewed with the Self-Guide Questionnaire (Higgins, Klein, & Strauman, 1985). Children's responses were coded for independent traits, interdependent traits, physical descriptors, and roles/relationships. Reliability was good ($K=.79$). T-tests showed that girls included more interdependent traits in their self-construals than did boys. There was no difference in girls' and boys' inclusion of independent traits in their self-construals. Results with our middle childhood sample replicate gender differences found in adulthood for interdependence, but not for independence.

#114 Being Shy With Parents Who Wish You Weren't: Children's Perceptions of Maternal Acceptance as a Function of Child Shyness and Maternal Attitudes toward Shyness

Laura M. Horsch, Thomas H. Ollendick*
Psychology

Although it is typically regarded as a negative and maladaptive trait, shy, inhibited behavior is not necessarily viewed as problematic by all parents. The present study investigated how maternal attitudes toward shyness and the presence of shy behavior in children influence children's perceptions of being accepted by their mothers. For example, do inhibited children feel more accepted by their mothers when their mothers hold positive attitudes toward inhibited behavior? The present study hypothesized that maternal attitudes toward shyness and inhibited behavior in children would interact to influence children's perceptions of maternal acceptance. A sample of 41 children between the ages of 3.5 and 4.5 years and their mothers were included in this study. Children's levels of shyness were obtained using the Infant-Preschool Scale for Inhibited Behaviors (IPSIB, Warren, 2001), maternal attitudes toward shyness were assessed using the Perceived Advantages of Shyness Survey (PASS, Schmidt & Tasker, 2000), and children's perceptions of maternal acceptance were measured using the Pictorial Scale of Perceived Competence and Social Acceptance – Preschool/Kindergarten version (PSPCSA, Harter & Pike, 1983). Analyses supported the hypothesized relationship. Although there were no significant main effects, there was a significant interaction between maternal attitudes toward shyness and shyness in children, $t(34) = -2.493, p = .017$. This finding suggests that maternal attitudes and the presence of inhibited behavior in children combine to produce children's perceptions of maternal acceptance.

#115 Parent-Child Agreement and the Validity of the ADHD module of the ADIS

Matthew Jarrett, Jennifer C. Wolff, Kimberly Kirby, & Thomas H. Ollendick*
Psychology

The concurrent validity of the attention-deficit/hyperactivity disorder (ADHD) module of the Anxiety Disorders Interview Schedule for DSM-IV, Child and Parent Versions (ADIS-C/P), was examined. One-hundred eighty-four children referred to a child assessment clinic were categorized into three ADIS-generated groups: no diagnosis of ADHD (No ADHD, $n = 63$), parent-only diagnosis of ADHD (Parent Only, $n = 81$), and parent and child diagnosis of ADHD (Parent + Child, $n = 40$). The groups were compared on demographics, comorbid diagnoses, behavior checklists, parental symptomatology, family environment, and a computerized test of attention. Results support the concurrent validity of the ADIS ADHD module and point to the relationship between internalizing symptomatology and parent-child agreement on ADHD diagnoses, as children who agreed with their parents on the presence of ADHD reported the most internalizing problems. Directions for future research are discussed.

#116 Relationship Education Program – RECOMMIT (Relationship Education for Couples and Marriages Making it Through)

Bryce Jorgensen, Fred Piercy, Megan Dolbin-MacNab, Pat Sobrero, Maggie Keeling,
Bonnie Graham, Susan Perkins*
Human Development

We have developed a flexible couple relationship program for low-income, at-risk couples built around couple risk and resilience factors. The RECOMMIT (Relationship Education for Couples and Marriages Making it Through) curriculum is presented in modules so that the leader, perhaps in consultation with the participants themselves, can determine which content best meets their unique needs. This program builds on the content of standard skill building programs in that it offers communication, conflict resolution, and affective expression skills. It also provides modules that address at-risk issues and behaviors – such as step-parenting, stress management, alcohol use, violence prevention, financial planning, and job hunting – that relate to couple distress and dissolution. Researchers are finding that specific relationship skills can indeed be taught and learned, and that these skills appear to relate to how couples communicate and handle conflict in the future (Silliman, Stanley, Coffin, Markman, & Jordan, 2002). Our program is an answer to the call for couple relationship programs that reach couples most at risk for marital distress (Larson, 2004).

#117 Factors that Influence Older Adults' Participation in a Structured Wellness Program

*Audrey J. Kemp**

Education, Curriculum & Instruction - Health Promotion

As the aging population increases, functional disability and physical impairment becomes prevalent, and efforts regarding disease prevention and health promotion among older adults (aged 60+) are warranted. Consequently, a growing emphasis has been placed on the importance of older adults' quality of life through maintaining function, maximizing autonomy, living in the community as opposed to institutionalization, and achieving maximum comfort despite debilitating illness. The present study was designed to explore the factors that affect older adults' participation in a structured wellness program. The sample (N = 103) consisted of 48 older adults that participated in a structured wellness program (e.g., YMCA, senior center), and 55 older adults that did not participate in a structured wellness program. Consistent with previous research, it was found that participants in a structured wellness program reported higher levels of life satisfaction, quality of life, and overall strength and endurance. It also was found that structured wellness program participants rated their current level of functioning higher and are less likely to receive professional or informal assistance than nonparticipants. Future improvements to encourage reluctant elders to participate in a community wellness program that will maximize their overall health and level of functional autonomy are suggested.

#118 The Reaction to Globalization: Political Islam

*Tugrul Keskin**

Sociology

Political Islam may be considered as one expression of anti-globalization and it represents an entire world-view that exists in opposition to globalization with its own historical and geographic arena, its own law, economics, and social policy, science and culture/identity. Political Islam has arisen in reaction to forces of globalization, and created its own structures of meaning in direct opposition to those of globalization and homogeneity. This has taken place according to Pieterse, as a result of anger in the Islamic world over Western double standards and political and social hegemony. People tried to create a cultural, economic and political ideology within the Islamic sphere in reaction to these forces of globalization. As a result of this, Islam becomes an ideology not a religion. Religious fundamentalism is benefiting from this trend. On the other side of this issue, are Western values conflicting with Islam? The question is whether Islam is compatible with democracy. Islam becomes the cultural defense mechanism. Today, in these countries cultural changes are taking place rapidly. But these rapid changes are forming a reactive type of cultural change rather than natural way.

#119 Runners and Blockaders: The Fight Over Maritime Commerce on the Eastern Shore of Virginia During the Civil War

*Matthew Krogh**

History

With the advent of the Union blockade came one of the most original, enterprising, and adventurous creatures of the Civil War, the blockade runner. Fed by the urge to transfer, people, goods, and supplies to mainland Virginia out of patriotism, greed, or rabble rousing, the blockade runner was the scourge of Union forces throughout the Chesapeake Bay. By running amuck of Union laws they were branded as outlaws by the Union but by running across the Chesapeake they were branded as saviors by the Confederacy.

#120 Lawrence O'Bryan Branch and the Battle of New Bern

*Leonard Lanier**

History

The 1862 Battle of New Bern, North Carolina ended in a Southern defeat, which cost the Confederacy much of eastern North Carolina. The Rebels dealt with insufficient ammunition, a weapons shortage, and an inadequate battle plan. Yet, overall responsibility for the defeat at New Bern lies with the Confederate commander—General Lawrence O'Bryan Branch.

The existing historiography of the Battle of New Bern reports that the Confederates lost due to superior Union numbers. However, according to Confederate records, Branch possessed the forces necessary to adequately defend New Bern from the Federal invasion force. As this paper will show, Branch could only blame himself for the loss of New Bern. Not only did he fail to prepare the battlefield for the Union invasion, but he also put his family's interests above that of eastern North Carolina's residents.

In order to support this argument, the author undertook an exhaustive search for documents related to General Branch and the Battle of New Bern. He consulted sources at the North Carolina State Archives, Duke, UNC, the University of Virginia, and the Virginia Historical Society. Via his efforts, the author hopes to add to the existing historiography of the Battle of New Bern.

#121 Cross-cultural Comparison of Consumer Perceptions of Service Recovery

*Kyuhoo Lee**

Hospitality and Tourism Management

This paper explores the cross-cultural impacts of service recoveries such as the consumer propensity to spread positive or negative word-of-mouth about casual dining restaurants. American and Korean consumers were compared in an effort to identify whether they had any differences or similarities in the effects of service recovery in terms of word-of-mouth and future patronage. The results of the study revealed that consumers have different behaviors on service recoveries in terms of future patronage, word-of-mouth intent and loyalty according to their culture. In general, Korean consumers' word-of-mouth intent, patronage, and loyalty tended to increase more significantly than those of American customers after successful service recoveries.

#122 Evaluation of Resident Policy Handbooks of Eight Assisted Living Facilities in Virginia

Sung-jin Lee, Dr. Rosemary Goss*

Department of Apparel, Housing, and Resource Management

The purpose of this study is to examine resident policies in assisted living facilities and to recommend consistent policies for resident handbooks. To accomplish this purpose, two investigations were conducted. In the first phase, a mail survey form was developed to determine current resident policies provided in existing assisted living facilities in Virginia. In the second phase, the researcher analyzed each policy from the eight participating assisted living facilities and then compared the policies to determine which policies should be included in resident handbooks. The researcher categorized various policies into one specific group if they showed similar content. For this reason, the study employed the content-analysis method, which is oriented to qualitative research. The framework for analyzing resident policies was divided into three sections: 1) policies related to administration, 2) policies related to resident services, and 3) resident activities listed in the handbooks. The recommendation of resident policies can help staff to manage assisted living facilities efficiently, and the handbooks will be able to offer prospective residents clear information as they make decisions among various assisted living facilities. Moreover, current residents will benefit from lucid and consistent resident handbooks in that they will provide explicit information about policies and services.

#123 Maximizing Students Quality of Life by Utilizing Virginia's FFA CDE Judging Team

John H "Rusty" Miller, Andy Seibel, Ryan G. Anderson
Career and Technical Education*

As educators our focus is on the future and preparing students for careers. We must challenge our common barriers of time constraints and resources, and work towards creating opportunities that our students can be involved in which will better prepare them for future employment. Through opportunities like Career Development Events students will be better prepared for the challenges that lay ahead (National FFA). Decision-making skills and self-confidence are just a few ways that judging prepares the students to utilize life skills. Also, skills such as public speaking, leadership, perseverance, and decisiveness are honed to a level allowing team members to set and reach goals that would otherwise be unattainable. Judging consists of utilizing all of the life skills that you need to succeed in life. Participants learn to be confident about their decisions, use logic when faced with a problem, express their ideas in a calm and poised manner, and to speak in front of strangers in addition to countless other skills that will successfully guide any person through school and through a career. The purpose of this study was to determine if participation in a state level CDE was tied to leadership development and future career endeavors.

#124 Visual Recognition Memory and Brain-Electrical Activity in 12-month-old Infants

Katherine C. Morasch, Martha Ann Bell, Ph.D.
Psychology*

Infants who demonstrate preferences for novel objects relative to familiar objects tend to have higher IQ scores during childhood than infants who do not have a novelty preference (Rose & Feldman, 1995). In this study, we examined the EEG activity of 48 12-month-old infants during a baseline phase and during the familiarization and retrieval phases of the infant recognition memory paradigm. Infants were allowed to accrue 4 looks at a glove puppet. Visual preference was later tested by pairing the familiar glove puppet with a novel glove puppet. Analysis of the baseline-to-task-related patterns of EEG during the familiarization phase (first glove) indicated that, regardless of performance outcome, initial encoding of the object involved baseline-to-task activation (meaning higher 6-9HZ power values) in lateral frontal regions as well as anterior and posterior temporal scalp sites. Further examination of this regional interaction during the comparison test also revealed frontal and temporal activation during the memory task, yet more specific involvement of lateral frontal and temporal areas. These results highlight the critical roles of both the temporal regions (classically associated with recognition memory processes, Nelson, 1995) as well as frontal lobe activation, indicative of sustained attention and effortful processing, in recognition memory processing.

#125 Progress in Meeting and Convention Site Selection Research

Kunsoon Park
Hospitality and Tourism Management*

The meetings and conventions industry has grown to become a significant economic, political, and social phenomenon. The "meeting" refers to any planned event in which two or more people get together to accomplish a set objective. The "convention" is defined as an assemblage of delegates, representatives, and member of an organization convened for a common purpose. An understanding of the meeting site selection process should be of considerable interest to both buyers and suppliers. The site is a critical factor in the success or failure of the event regardless of the type of meeting, convention, or exposition. Billions of dollars are spent annually on meetings and conventions. Despite the importance of this activity to both individual properties and host cities, little research has attempted to understand the site selection process. Research in this area has the potential to contribute substantially to improve decision-making. A better understanding of what it takes to develop a competitive convention destination may benefit both host and guest by reducing wasteful expenditure and resulting in improved customer service.

#126 Virginia's Reaction to the Gettysburg Address, 1863-1963

*Jared Peatman**

History

As of March 2006, there is not a single book or article that discusses Southern reactions to the Gettysburg Address in more than a passing fashion. By examining Virginia newspapers from the fall of 1863 this paper will bring to light what Civil-War-era-Southerners thought of the Gettysburg Address. This paper is confined to Virginia not because that state is representative of the Confederacy, but because Southern reporting on the Address was wholly shaped by the Richmond dailies. The first three chapters are not only a discussion of Southern reactions to the Gettysburg Address, but also an examination of how information was disseminated throughout the Confederacy during the Civil War. The fourth and final chapter traces Virginia's reaction to the Address up to 1963. Drawing on newspaper editorials, textbooks adopted by Virginia's schools, coverage of the major anniversaries of the Address in the state's newspapers, and accounts of Memorial Day celebrations, this chapter makes clear the different interpretations of and reactions to the Address in the North and South. This divergence of reaction, even in 1963, lays bare the myth of a completed sectional reconciliation and shared national identity.

#127 Parental Emotion Socialization and Children's Gendered Speech

Marie B. Perez-Rivera, Grace Zoller*

Psychology

Thirty parents (11 fathers and 19 mothers) and their 9-10 year old children (15 boys and 15 girls) participated in an investigation of the influence of parent gender and child gender on the amount of gendered talk about emotions. The dyads played a game entitled LifeStories in which they discussed emotion-laden family memories for thirty minutes. Parents' and children's responses were coded separately to identify gendered terms and positive and negative emotion terms throughout their conversation. T-tests showed that daughters talked more overall than did sons. Furthermore, fathers and mothers did not differ from one another in the amount of speech with children. We conducted ANOVAS to test for an interaction between parent gender and child gender on the amount of gendered terms used throughout their conversations, there was no significant interaction. Results indicate that child gender was the most influential predictor of conversation length.

#128 Online Support for Teacher Community of Practice

*Aaron Powell**

Learning Sciences, Instructional Design and Technology

The National Board for Professional Teaching Standards requires that teachers participate in professional leaning community. Yet teaching remains a private practice. The learning theory of community of practice informs some strategies for supporting learning community: establish interdependence with access to member knowledge and ensure members have authentic reasons to participate and collaborate. To support access with enhanced communication and file sharing, an online community portal is introduced to a cohort of practicing teachers. An implementation of an open-source cooperative learning system, Sakai, is used by participants to manage a collaborative course project, the design and development of a resource website to support literacy in the local community. Participants negotiate both the product and process of this project, including how they use the technology, thus allowing for greater authenticity of activities. This mixed methods study uses observations and interviews to examine what activities emerge for the use of the technology in supporting the cooperative work and how they impact the overall community of practice. Some quantitative measures indicate how these activities impact individuals' sense of community and levels of contribution. Results should inform instructional design and technology for other teachers' communities of practice.

#129 An Examination of the Potential Causes of Deviant Behavior

Virginia Rothwell, James Hawdon*

Sociology

Sociologists have long been interested in determining what leads an individual to engage in deviant behavior. Multiple researchers have concluded that individuals' attitudes towards deviance are good predictors of their involvement in deviant acts. However, little is known about what causes these attitudes. This research offers an explanation and empirical test of the potential causes of tolerant attitudes toward deviant behavior. Based on the arguments of Weber, Habermas and others, the processes of modernization and rationalization lead to the adoption of a secular worldview that is dominated by a scientific orientation and a concern with individualism. We hypothesize that a secular worldview leads to an increased tolerance of deviance. We also hypothesize that individualism leads to the tolerance of deviance. The hypotheses are tested with data from the 1998 GSS and results indicate that a secular worldview increases tolerance of deviant behaviors including: the legalization of marijuana, teenage sex, premarital sex, extramarital sex, homosexuality, and teenagers between the ages of fourteen and sixteen having access to birth control even if their parents do not approve. These results hold true even when controlling for religiosity. This research is important because the psychosocial correlates of deviant behavior such as low self-esteem, low self-control, and having a deviance prone personality are unable to adequately explain cross-cultural and historical patterns of deviant behavior. The insights provided by this research can mediate this problem and explain why modernized nations have higher rates of deviant behavior, such as illegal drug use, than non-modernized nations.

#130 The Problem with Tenure: Experiences and Challenges of African American Female

Faculty

*Tonya N. Saddler**

Educational Leadership & Policy Studies

Despite gains made in higher education, African American female faculty experience problems elevating their careers in the academy (Singh, Robinson, & Williams-Green, 1995). One challenge experienced by this group is gaining tenure. Access to tenure has become an ambiguous process with unwritten rules usually discussed behind closed doors (Cooper & Steven, 2002, Thomas & Hollenhead, 2001, Tierney, 2002). This research study examined the pre-tenure experiences of African American female faculty members at a predominately White institution (PWI). To better understand the experiences and pre-tenure challenges, African American female tenured associate professors were interviewed. A qualitative research design with semi-structured interviews was employed. Interviews were designed to gather general information on pre-tenure experiences in the areas of research, teaching, and service. Three overarching themes characterized the experiences of these participants. First, participants felt caught in the cross currents. They were asked to do one thing, but were assessed on another. Second, faculty members were clear about research and publication requirements, but had unique teaching techniques and approaches to students in addition to other departmental and institutional commitments. Lastly, faculty members had high teaching standards which optimize student learning. This approach did not jive well with colleagues who promote teacher centered learning.

#131 Nanotech's History: An Interesting, Interdisciplinary, Ideological Split

*Ashley Shew**

Science & Technology Studies

Nanotechnology, a developing, well-funded, and interdisciplinary field of science and technology, is looked at by those in favor of its development in two very different ways. The divide in the emerging field of nanotechnology is not a recent development in its rather short history. This paper aims to describe the origins of the differing visions of nanotechnology and examine the broader impacts of the type of divide we see in nanotech. The typical history of this field tells us nothing about these differing visions in nanotech and perhaps misleads. There are two distinct camps among scientists and engineers who pursue work on the nanoscale and the vision they have of their work – this is not a novel observation. But, the two groups rarely interact on any deep level, and, when they do, they seem to get nowhere. This talk looks first at definitional issues in the field, then turns to common history of nanotechnology, looking at the history's shortcomings and one particular episode in its history that highlights the divide, and then examines the broader impacts of this dispute.

#132 Are Family-Controlled Firms Family Friendly? A Stakeholder Approach to Firm Performance.

*Manisha Singal**

Management

Past research has found that family controlled firms have superior financial performance and greater growth when compared to non-family controlled firms, controlling for size and industry. At the same time, empirical evidence suggests that there is a positive correlation between corporate social performance (CSP) and firm financial performance. This study relates CSP to progressive Human Resource (HR) policies (as in social responsibility to employees), and relates these two streams of research to examine whether an important component of CSP namely progressive HR policies of the firm lead to superior performance of family firms. We hypothesize that family firms are more likely to have higher performance as a consequence of a no layoff policy and family friendly policies. The study has implications for socially responsible strategy makers and managerial elites who can use family firms as referent models for long term performance, for HR practitioners who make policies, and for individual employees who make employment selection decisions. More importantly, the findings of the study also have public policy implications as regulators and non governmental organizations alike seek to understand and influence private firms to view labor as a stakeholder rather than only a substitutable factor in the production process.

#133 Racially Integrated Churches and Explanations for Racial Inequality

*Amanda Noell Stanley**

Sociology

Recent research by Emerson and Smith (1999) finds that conservative Protestants tend to blame racial inequalities on individual traits like motivation or ability as opposed to structural constraints such as oppression or discrimination. Emerson and Smith have also established that churches tend to be racially homogenous organizations. The purpose of this study is to find out whether or not members of racially integrated denominations differ in their explanations for racial inequalities. Will the explanations for inequality given by Protestants in racially integrated churches differ from the explanations given by members in racially homogenous churches? I am interested in further exploring interracial relations in the context of North American Protestant churches, particularly how the level of contact with persons of another race might affect individuals' perceptions of reasons for inequality. I expect to find that denominations with more racial homogeneity will have more members give individual-level explanations why there is a gap in the socioeconomic status between whites and blacks. I will use data from the National Congregations Study (1998) and the General Social Survey (1998) to both explore the racial makeup of North American Protestant Denominations and to statistically analyze the relationship between denominational affiliation and explanations for racial inequalities.

#134 The Effects of Child Abuse Potential and Resting Heart Rate on Reactive and Proactive Aggression

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Clinical Psychology

Proactive aggression is used to obtain a specific goal, while reactive aggression is associated with emotional responses to provocation (Dodge, 1993). The presence of both social and biological variables are suggested to increase the risk of aggressive behavior. This study examined the influence of HR on the relationship between child abuse potential and reactive/proactive aggression. Thirty six 7 – 13 years olds participated. Parents completed the Revised Parent Rating Scale for Reactive and Proactive Aggression, a measure of proactive/reactive aggression in children, and the Child Abuse Potential Inventory to assess the potential for physical child abuse. HR was assessed in beats per minute (bpm) from a three-lead electrocardiogram. Hierarchical linear regressions were conducted for proactive and reactive aggression. The model predicting proactive aggression was significant $F(9,35)=5.368$, $p=.004$ and an interaction effect was found for HR by CAP (partial $t(35)=-3.060$, $p=0.004$, $\beta=.469$). For reactive aggression, the same interaction term (HR x CAP) was significant (partial $t(35)=-2.657$, $p=.012$, $\beta=-.421$). After significant interaction terms were confirmed, post hoc probing was performed. For both types of aggression, high HR was associated with reductions of aggression and increased CAP. Low HR was associated with increased reactive/proactive aggression as CAP increased.

#135 The Relationship between Sexual Revictimization, General Self-Efficacy, and Locus of Control

Anthony O. Wells, Angela Scarpa*
Psychology

The present study examined whether general self-efficacy and locus of control differed by frequency of sexual victimization. Three hundred and forty-seven college females completed questionnaires which evaluated the concepts of general self-efficacy, or a general belief in one's abilities, in addition to locus of control, or one's perception that outcomes in life are due primarily to forces within one's control or beyond one's control. Of the entire sample, 83.1% ($n=290$) reported never being sexually victimized, 12.4% ($n=44$) sexually victimized once, and 4.5% ($n=16$) sexually victimized twice or more times, and these categories served as the groups for the analyses. Significant group differences emerged for general self-efficacy, $F(3, 343) = 2.78$, $p = .05$ (Never group $M=61$; Once group $M=58$; Twice or more group $M=64$), where the group with two or more victimization experiences had higher mean self-efficacy scores than the other two groups. There were no significant group differences for locus of control. General self-efficacy appears to be higher in revictimized women. Perhaps, revictimized individuals perceive themselves as high in general self-efficacy, which may be associated with greater risk-taking or an unrealistic general perception of being capable.

#136 The Mediating Role of Self Perceived Social Acceptance in Preventing Anxiety

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Psychology

Negative peer experiences such as bullying, isolation, and victimization have been associated with peer rejection and increased anxiety. Studies investigating gender differences in anxiety demonstrate that girls are more likely to show symptoms of anxiety than boys (e.g. Craig 1998). Additionally, studies show that this difference may become more pronounced over time (e.g., Crick & Ladd, 1993). Thus, it is important to consider longitudinal predictors of anxiety as well as the role of gender as a possible moderator. This poster will present data from a longitudinal study in an effort to explore the role of specific psychosocial factors that may predict anxiety. Data for this poster are part of a larger six-year prospective study of 722 students from four middle schools in Southwestern Virginia. Results demonstrate that the relationship between peer likeability and anxiety is moderated by gender in eighth grade. Moreover, the same pattern of findings was found in the twelfth grade, suggesting that eighth grade self perception of social competence predicts later anxiety and may serve as a protective factor for girls. Implications of these findings will be discussed in terms of psychosocial interventions for youth at risk for anxiety with special reference to sex of the children.

#137 Intending to Purchase from Women-owned Enterprises? An Empirical Test of Corporate Purchasers' Decision-making using Ajzen's Theory of Planned Behavior

*Jiyun Wu**

Management

Though 48% of all privately-held firms are at least 50% owned by a woman or women, women-owned enterprises received only 9% of the institutional investment deals and 2% of the dollars in 1999. In the corporate supplier market, women-owned enterprises obtained only 4% of the market share. Using Ajzen's (1985, 1991) theory of planned behavior, this study attempts to explore corporate purchasers' decision (not) to purchase from women-owned enterprises. In particular, the study attempts to uncover corporate purchasers' attitude toward purchasing from women-owned enterprises and their beliefs about the outcomes of such purchases. As women-owned enterprises are becoming a powerful economic force, the study has important policy implications for women-owned enterprises, corporations as their customers, other market players such as venture capitalists, and government policy-makers.