K-State Research Forum

Program Booklet

Wednesday, March 26, 2014
K-State Student Union

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10:15 – noon	Graduate Biological Sciences 1	Sunflower Room

Afternoon Oral Presentations

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1:30 – 4:00	Graduate Engineering/Math/Physical Sciences 2	Room 227
1:45 – 4:00	Graduate Biological Sciences 2	Sunflower Room

Poster Sessions

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9:30 – 11:30	Undergraduate Student Poster Judging	
1:30 – 3:30	Graduate Student Poster Judging	
1:30 – 3:30	Capital Graduate Research Summit (CGRS) Poster Presentations	

Awards Ceremony

4:30	Flint Hills Room

*The awards ceremony will include a keynote address by Dr. Susan Brown, University Distinguished Professor of Biology.

Oral Session Schedules

Graduate Interdisciplinary
Cottonwood Room
9:00AM – 12:15PM

9:00 **SEQUESTRATION OF SELENIUM IN FLUE GAS DESULFURIZATION WASTEWATER USING A CONSTRUCTED WETLAND TREATMENT SYSTEM**
Madhubhashini Galkaduwa

9:15 **X-RAY SPECTROMICROSCOPY STUDIES OF INTACT SOIL MICROAGGREGATES FROM A TROPICAL LONG TERM AGROECOSYSTEM**
Pavithra Pitumpe Arachchige

9:30 **COMPARISON OF SIMILARITIES AND DIFFERENCES IN ARYLMETHANE DYE DECOLORIZATION BETWEEN PLANTS AND CRUSHED ROOT EXTRACT**
Rohit Kamat

9:45 **STABILIZING LIQUID CHEMICALS USING CO-CRYSTALLIZATION TECHNIQUE**
Tharanga Kumudini Wijethunga

10:00 **MODELING MICROBIAL IRON REDUCTION: EFFECT OF FULVIC SUBSTANCES**
Harshad Kulkarni

10:15 **PALEOECOLOGICAL RECONSTRUCTION OF A MODERN SUBALPINE WHITEBARK PINE (PINUS ALBICAULIS) COMMUNITY IN GRAND TETON NATIONAL PARK, WYOMING, USA**
Kyleen Kelly

BREAK

10:45 **EFFECTS ON GROUNDWATER QUALITY FROM SURFACE WATER BODIES ON ARSENIC DISTRIBUTION IN BANGLADESH: GEOCHEMICAL AND HYDROLOGICAL CONTROL**
Shovon Barua

11:00 **GEOCHEMICAL QUANTIFICATION AND DETERMINATION OF THE FEASIBILITY FOR CO2 STORAGE IN KANSAS**
Brent Campbell

11:15 **HYDROGEOCHEMICALAND SEDIMENT MICROBIAL RELATION STUDIES ON DIFFERENT DEPTH AQUIFER SEDIMENTS FROM MATLAB, BANGLADESH**
MD Golam Kibria

11:30 **NOVEL BIOMASS PRETREATMENT METHOD FOR ADVANCED BIOFUELS AND CHEMICALS PRODUCTION**
Yadhu Guragain

11:45 **UTILIZATION OF HEMICELLULOSE-RICH BIOMASS FEEDSTOCKS FOR THE PRODUCTION OF SINGLE CELL OILS**
Kyle Probst

12:00 **LACTIC ACID BIOSYNTHESIS FROM BIOMASS DERIVED SUGARS VIA LACTOBACILLUS PLANTARUM AND LACTOBACILLUS BREVIS CO-FERMENTATION**
Yixing Zhang

Graduate Agricultural Sciences
Big XII Room
9:30AM – 12:00PM

9:30 **NITROGEN FERTILIZER SOURCE AND PLACEMENT EFFECTS ON N2O EMISSIONS AND GRAIN YIELD IN NO-TILL CORN**
Leonardo Bastos

9:45 **EVIDENCE FOR GEOGRAPHICAL ORIGIN BASED POPULATION STRUCTURE AND GENETIC DIVERSITY IN SORGHUM ACCESSIONS WITH DIFFERENTIAL RESPONSE TO GRAIN MOLD**
Dilooshi Weerasooriya

10:00 **SHOULD IT STAY OR SHOULD IT GO? POSSIBLE FACTORS INVOLVED IN LESSER GRAIN BORER DISPERSAL BEHAVIOR**
Erick Cordeiro

10:15 **INFESTATION OF SOUND AND ARTIFICIALLY-DAMAGED HARD RED WINTER WHEAT KERNELS BY FIRST INSTARS OF THE LESSER GRAIN BORER**
Mario Andrada

10:30 **EVALUATING THE EFFECTS OF CORN MICRON SIZE IN PELLETED DIETS ON NURSERY PIG GROWTH PERFORMANCE**
Grace Bokelman

BREAK

11:00 **RESISTANCE OF THREE POWERBAR PACKAGES TO INFESTATION BY THE PLODIA INTERPUNCTELLA**
Deanna Scheff

11:15 **NUTRITIONAL ENHANCEMENT OF DRIED DISTILLER'S GRAINS WITH SOLUBLES VIA SPOROBOLOMYCES ROSEUS FERMENTATION**
Jonathan Wilson

11:30 **EFFECTS OF UVB RADIATION ON INTUMESCENCE DEVELOPMENT IN IPOMOEA BATATAS**
Joshua Craver

11:45 **SCREENING FOR STALK ROT AND DROUGHT TOLERANCE: TOWARDS ENHANCED SORGHUM PRODUCTIVITY**
Ananda Bandara

Graduate Engineering, Math, & Physical Sciences 1
Flint Hills Room
10:00AM – 12:15PM

10:00 **PRODUCTION OF DIMETHYLFURAN FROM HYDROXYMETHYLFURFURAL, A BIOMASS DERIVED PRODUCT, USING A CATALYST COATED POLYMERIC MEMBRANE REACTOR**
John Stanford

10:15 **USING D-D FUSION NEUTRONS FOR MATERIAL INTERROGATION FOR THE HOMELAND SECURITY PURPOSES**
Amgad Mohamed

10:30 **X-RAY INTERROGATION OF MATERIALS USING DENSE PLASMA FOCUS FOR HOMELAND SECURITY**
Mohamed Ismail

10:45 **PLEISTOCENE TO HOLOCENE MAFIC VOLCANISM IN THE UPPER WIND RIVER BASIN, WY**
Anna Downey

BREAK

11:15 **PETROLOGIC CONSTRAINTS ON CAMBRIAN AGED FLOOD BASALT VOLCANISM IN THE SOUTHERN OKLAHOMA AULOCOGEN**
Jasper Hobbs

11:30 **JARBIDGE RHYOLITE IN NORTHEASTERN NV: RELATIONSHIPS BETWEEN THE CENOZOIC EVOLUTION OF THE NORTHERN GREAT BASIN AND THE YELLOWSTONE HOTSPOT**
Andrew Ingalls

11:45 **AN INVESTIGATION INTO THE EFFECTS AND IMPLICATIONS OF GAMMA RADIATION ON ORGANIC MATTER, CRUDE OIL, AND HYDROCARBON PRODUCTION**
Logan Kelly

12:00 **CORRELATION OF MARINE TERRACES USING LUMINESCENCE DATING TECHNIQUES TO TEST QUATERNARY SLIP RATE ESTIMATES OF THE NORTHERN SAN ANDREAS FAULT.**
Jennifer Roozeboom

Graduate Biological Sciences 1
Sunflower Room
10:15AM – 12:00PM

10:15   **EFFECT OF CALF GENDER ON MATERNAL MILK PRODUCTION AND COMPONENTS IN HOLSTEIN COWS**
Abigail Carpenter

10:30   **DOES FOOD ABUNDANCE AFFECT WITHIN-SEASON DISPERSAL OF MALE GRASSHOPPER SPARROWS?**
Emily Williams

10:45   **A COMPARATIVE STUDY ON THE DISTRIBUTION OF ADULT DECTES TEXANUS IN CONTINUOUSLY PLANTED SOYBEAN FIELDS**
Alice Harris

11:00   **IDENTIFICATION OF A G-PROTEIN COUPLED RECEPTOR THAT PLAYS AN IMPORTANT ROLE IN REPRODUCTIVE ISOLATION IN ALLONEMOBIUS**
Bettina Jancke

11:15   **DIFFERENT PHYSIOLOGICAL ROLES OF TWO DOPAMINE RECEPTORS IN SALIVATION OF THE BLACKLEGGED TICK, IXODES SCAPULARIS SAY.**
Donghun Kim

11:30   **FUNCTIONAL ANALYSIS OF CYTOCHROME P450 GENES IN THE YELLOW FEVER MOSQUITO AEDES AEGYPI (DIPTERA: CULICIDAE)**
Moustapha Soumaila Issa

11:45   **INVESTIGATING PROSTAGLANDIN E2 SYNTHASE IN THE BLACKLEGGED TICK, IXODES SCAPULARIS**
Joshua Urban

Undergraduate Research
Cottonwood Room
12:30PM – 3:30PM

12:30 **CHLORELLA EXTRACT CAUSES FUNCTIONAL DIFFERENTIATION OF INNATE IMMUNE CELLS IN CULTURE AND REGULATES THE GROWTH OF COLON CANCER CELLS**
Zachary Goldsmith

12:45 **DEVELOPMENT OF THREE DIMENSIONAL CULTURE SYSTEMS FOR AN EFFICIENT EVALUATION OF ANTITUMOR AGENTS**
Katie Turner

1:00 **ASSESSING AND DEVELOPING DEPARTMENTAL RECRUITMENT PROCESSES**
Brooke Harshaw

1:15 **HOW DOES PHENOLOGY AND SEED PRODUCTION OF BIG BLUESTEM (Andropogon gerardii) VARY ACROSS THE CLIMATE GRADIENT OF THE GREAT PLAINS? A RECIPROCAL GARDEN APPROACH TO DISTINGUISH ROLES OF SITE AND ECOTYPE**
Matthew Galliart

1:30 **DOES MORE REHEARSAL TIME IMPROVE PEOPLE'S ABILITY TO DECEIVE OTHERS?**
Levi Smith

1:45 **INFLUENCING PUBLIC PERCEPTION OF THE NEWS: THE QUESTION OF USER GENERATED CONTENT AND MISATTRIBUTION**
Adam Mason

BREAK

2:15 **RESEARCH PRIORITIES IN CHILD NUTRITION PROGRAMS**
Megan Norman

2:30 **LIGHTING, VISION, AND AGING IN PLACE: THE IMPACT OF LIVING WITH LOW VISION IN INDEPENDENT LIVING FACILITIES**
Jordan DeTar Newbert

2:45 **THE ADAPTIVE REUSE OF RURAL SCHOOLS AND THE EFFECTS ON THE COMMUNITY AND QUALITY OF LIFE**
Hillary L'Ecuyer

3:00 **PERSISTENCE OF BLEED AIR CONTAMINANTS ON HIGH-EFFICIENCY PARTICULATE ABSORPTION FILTERS**
Michael Omana

3:15 **VISUAL CUEING AND FEEDBACK INFLUENCING UNDERGRADUATE STUDENTS' REASONING RESOURCES ON CONCEPTUAL PHYSICS PROBLEMS**
Jeffrey Murray

Graduate Social Sciences, Humanities, & Education
Big XII Room
12:45PM – 3:30PM

12:45 **IMPACT OF FOOD SAFETY MESSAGES ON CONSUMER FOOD HANDLING BEHAVIORS**
Donka Milke

1:00 **SEXUAL PREJUDICE AMONG MIDWESTERN PRE-SERVICE AND IN-SERVICE TEACHERS**
Joelyn Foy

1:15 **MULTIRACIAL GRADUATE STUDENTS' LIVED EXPERIENCES IN HIGHER EDUCATION**
Grizelda MacDonald

1:30 **THE ROLE OF FRAMES AND TALK IN PUBLIC DELIBERATION: A ROADMAP OF DELIBERATIVE DIALOGUE**
Brock Ingmire

1:45 **CUSTODY ARRANGEMENT DECISIONS IN DIVORCED OR SEPARATED FAMILIES**
Jaimee Hartenstein

BREAK

2:15 **EXAMINING THE ROLE OF VARIOUS FAULT ATTRIBUTIONS IN CHILDREN'S ANTICIPATED RESPONSE TO HYPOTHETICAL PEERS WITH UNDESIRABLE CHARACTERISTICS**
Taylor Wadian

2:30 **'DOCTOR IT HURTS SO MUCH I CANT SIT DOWN': MEDIA AND HEALTH COVERAGE OF BUTTOCK SILICONE INJECTIONS**
Faith Thanji

2:45 **DID ASYMMETRIC MONETARY PREFERENCES FOR THE OUTPUT GAP DISAPPEAR DURING RECENT ECONOMIC TIMES?**
Hedieh Shadmani

3:00 **IS SUGARCANE A NEW DRIVER OF LAND USE AND LAND COVER CHANGE IN THE BRAZILIAN SAVANNA?**
Gabriel Granco

3:15 **SOCIO-ECONOMIC VARIABILITY AMONG GREAT PLAINS COUNTIES OF KANSAS AND NEBRASKA**
William Wetherholt

Graduate Engineering, Math, & Physical Sciences 2
Room 227
1:30PM –4:00PM

1:30   **HOW CAN WE UNDERSTAND MOLECULAR INTERACTIONS USING COMPUTERS?**
Gayani Pallewela

1:45   **EVALUATION OF THE CHARACTERISTICS OF RED LIGHT RUNNING CRASHES AND COMPARISON WITH OTHER INTERSECTION CRASHES**
Ishani Dias

2:00   **A SOFTWARE TO CAPTURE THE REAL PERFORMANCE OF RC COLUMNS**
Fatemeh Shirmohammadi

2:15   **2 CALABI-YAU CATEGORIES AND QUIVERS**
Jie Ren

2:30   **A CLASS OF GEOMETRIC REPRESENTATIONS OF COHOMOLOGICAL HALL ALGEBRA**
Xinli Xiao

BREAK

3:00   **DEMONSTRATING A MID-INFRARED OPTICALLY PUMPED GAS-FILLED HOLLOW-CORE FIBER LASER**
Neda Dadashzadeh

3:15   **MID-IR OPTICAL FIBER TRANSMISSION FOR GAS FILLED PHOTONIC CRYSTAL LASERS**
Mary Harner

3:30   **FREE-SPACE NPR MODE-LOCKED ERBIUM DOPED FIBER LASER BASED FREQUENCY COMB TOWARDS APPLICATION TO OPTICAL FREQUENCY MEASUREMENT**
Turghun Matniyaz

3:45   **PORTABLE ACETYLENE FREQUENCY REFERENCES IN GAS-FILLED PHOTONIC MICROCELLS**
Chenchen Wang

Graduate Biological Sciences 2
Sunflower Room
1:45PM – 4:00PM

1:45   **PROPER PROTEASOME ASSEMBLY: THE PLAY OF AFFINITY SWITCH BY PROTEASOME CORE PARTICLE**
Prashant Wani

2:00   **HOST SPECIES-SPECIFIC INHIBITION OF PROTEIN KINASE R BY LEPORIPOXVIRUSES**
Chen Peng

2:15   **DEFECIENCY OF THE LYSOSOMAL STORAGE DISORDER-RELATED PROTEIN CLN5 INDUCES ALTERATIONS IN AUTOPHAGY**
Theodore Budden

2:30   **MOLECULAR MECHANISMS OF HOST RANGE GENES IN VACCINIA VIRUS**
Sherry Haller

BREAK

3:00   **MULTIPLE NUCLEAR LOCALIZATION SIGNALS MEDIATE NUCLEAR LOCALIZATION OF THE GATA TRANSCRIPTION FACTOR AREA**
Cameron Hunter

3:15   **A NOVEL LUMINOL LUMINISCENCE BASED THERANOSTICS FOR BREAST ADENOCARCINOMA**
Hamad Alshetaiwi

3:30   **IDENTIFICATION OF KEY RESIDUES INVOLVED IN IMMUNE ANTIGONIST FUNCTION OF PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS NSP1BETA PROTEIN**
Yanhua Li

3:45   **FAVORABLE ALLELE ON CHROMOSOME 4 IS ASSOCIATED WITH RESILIENCE TO PORCINE CIRCOVIRUS ASSOCIATED DISEASE**
Megan Niederwerder

Poster Titles and Presenters

Undergraduate Student Posters
KS Ballroom
On display 9:30AM – 5:00PM
Judging: 9:30AM – 11:30AM

Group 1

1. **INVESTIGATIN THE EFFECTS OF ELEVATED TEMPERATURE ON TOMATO SPOTTED WILT VIRUS ACCUMULATION AND EXPRESSION OF PUTATIVE HEAT-SHOCK PROTEIN GENES IN THE INSECT VECTOR, FRANKLINIELLA OCCIDENTALIS**
   Obdulia Covarrubias

2. ~~**EXERCISE-INDUCED ACTIVATION OF P53 MAY BE BENEFICIAL TO CANCER PREVENTATIVE PATHWAYS**~~
   ~~Emily Ewert~~   ***WITHDREW****

3. **STRUCTURE DETERMINATION OF THE YEAST PROTEASOME CHAPERONE NAS2**
   Eric Geanes

4. **THE PROTEASOME CORE PARTICLE CHAPERONE PBA1 AND 2 PREVENT FORMATION OF NON-FUNCTIONAL PROTEASOME.**
   Alex Ondracek

5. **CHARACTERIZING THE INSECT VECTOR RESPONSE TO RHABDOVIRUS INFECTION**
   Jazmin Zeledon

6. **DEPTHWISE PETROPHYSICAL VARIATIONS OF THE ARBUCKLE AQUIFER: IMPLICATIONS FOR CO2 STORAGE**
   Michael Vega

7. **IMPACT OF NITRATE SUPPLEMENTATION VIA BEETROOT JUICE ON CAPILLARY HEMODYNAMICS IN SKELETAL MUSCLE OF RATS IN CHRONIC HEART FAILURE**
   Alexander Fees

8. **ENHANCED POOL BOILING HEAT TRANSFER USING GRAPHENE-COATED SURFACES**
   Ashton Archer

9. **DEVELOPMENT OF IMAGE PROCESSING ALGORITHMS TO AUTOMATE SOYBEAN APHID (Aphis glycines) SCOUTING**
   Dylan Kraus

10. ~~**EFFECT OF MICRO-STRUCTURED SURFACE GEOMETRIES ON CONDENSATION HEAT TRANSFER**~~
    ~~Andres Martinez~~   ***WITHDREW****

11. **CONTROL SYSTEM DESIGN FOR A REDUCED GRAVITY SIMULATION HOIST**
    W. Jacob Wagner

12. **A COMPARATIVE CASE STUDY OF THE RISK AND CRISIS COMMUNICATION BETWEEN THE 2008 SALMONELLA OUTBREAK AND A LOCAL DAIRY RECALL**
Claire Carlson

13. **LINKEDIN RESEARCH**
Brandi Herman

14. **COLLEGE WOMEN'S WELL WOMAN HEALTH: CONNECTIONS WITH COMMUNICATION, RELATIONSHIP, EFFICACY, AND BEHAVIOR**
Audrey Banach

15. **PHASES OF COPING FOR PARENTS OF A CHILD WITH A DEVELOPMENTAL DISABILITY: EXPLORING A NEW LIFE SPAN MODEL**
Juliana Malone

16. **TRAUMA DISCLOSURE: A COMPARISON OF TRAUMA SYMPTOMS AND RELATIONSHIP QUALITY IN MILITARY COUPLES**
Laura Walker

17. **AFFECTIVE RESPONSES TO VARIOUS EXERCISE TRAINING MODALITIES**
Blake Johns

18. **IMPLICATIONS FOR HIGH-INTENSITY FUNCTIONAL TRAINING WITH FOCUS ON STRENGTH GAINS IN BOTH EXPERIENCED AND NON-EXPERIENCED INDIVIDUALS**
Jacob Frye

19. **UNDERSTANDING THE RELATIONSHIP OF DIFFERENT NOVELTY ASSESSMENTS IN SPRAGUE DAWLEY RATS**
Zack Dietz

20. **THE EFFECTS OF ISOLATION ON PCREB EXPRESSION IN THE ABSENCE OF FEAR LEARNING**
Kathryn Johns

21. **THE EFFECTS OF FLUOXETINE AND ENVIRONMENTAL ENRICHMENT ON THE EXPRESSION OF DEPRESSIVE-LIKE STATES IN MALE RATS**
Christy Peterson

22. **PARENTS OF CHILDREN WITH DOWN SYNDROME: A COMPARISON OF PRENATAL AND POSTNATAL DIAGNOSIS GROUPS**
Natira Staats

Graduate Student Posters
KS Ballroom
On display 9:30AM – 5:00PM
Judging: 1:30PM – 3:30PM

<u>**Agricultural Sciences**</u>

23. MEASURING SOYBEAN CYST NEMATODE POPULATIONS USING REMOTE SENSING
Hatice Aslan

24. VARIATION IN NITROGEN USE EFFICIENCY AND NITROGEN RESPONSE IN WINTER WHEAT VARIETIES COMMON TO THE CENTRAL GREAT PLAINS
Nathaniel Dorsey

25. ~~EFFECT OF HEAD REMOVAL ON JUICE AND SUGAR YIELDS OF SWEET SORGHUM~~
~~Jebril Jebril~~   *****WITHDREW*****

26. THE EFFECTS OF CANNING ON B –VITAMIN DEGRADATION IN A CAT FOOD DIET
Shelby DeNoya

27. CHARACTERIZING THE EFFECTIVENESS OF COMMERCIAL HEAT TREATMENTS
Jennifer Frederick

28. EVALUATION OF COMMON ANALYSIS METHODS FOR OXIDATIONIN RENDERED PROTEIN MEALS USED TO PRODUCE PET FOODS
Morgan Gray

29. THE EFFECTS OF GELATIN AND EXTRUDER CONDITIONS ON THE FLOW PROPERTIES AND TEXTURE OF PET FOOD
Analena Simmons

Biological Sciences

30. INFLUENCE OF SOYBEAN APHID BIOTYPES ON CHLOROPHYLL LOSS OF DIFFERENT SOYBEAN GENOTYPES
Predeesh Chandran

31. DIVERSITY AND SIGNIFICANCE OF THE MICROBIAL COMMUNITY IN THE LARVAL DEVELOPMENT AND VECTOR COMPETENCE OF CULICOIDES SONORENSIS FOR EHDV
Dinesh Erram

32. BLOCKADE OF ATP-SENSITIVE POTASSIUM CHANNELS IMPAIRS VASCULAR CONTROL IN EXERCISING RATS
Clark Holdsworth

33. DEVELOPMENT OF DIAGNOSTIC REAGENTS AND ASSAYS FOR DETECTION OF PORCINE EPIDEMIC DIARRHEA VIRUS INFECTION
Russell Ransburgh

41. EXPLORATION OF NATURAL DYES FROM NATIVE KANSAS WALNUT, OSAGE ORANGE, AND CEDAR SAWDUST ON COTTON YARN FOR USE IN A HAND-WOVEN GARMENT.
Kelsie Doty

42. ANTECEDENTS OF ACQUIRING REUSED JEANS: DEVELOPING HYPOTHESES AND RESEARCH MODEL ON THE ROLE OF PERCEIVED CONSUMER EFFECTIVENESS, SELF-EFFICACY, AND EGO-DEFENSIVENESS
Mohammad Islam

43. AN ANALYSIS OF BENEFITS SOUGHT WITHIN THE SMART CLOTHING MARKET: A CASE STUDY OF SMART SPORTSWEAR
Manoshika Ramasamy

44. EXPLORATION OF THE EFFECT OF SOCIAL NETWORKING SITES ON ENVIRONMENTALLY SUSTAINABLE APPAREL PURCHASE INTENTIONS
Lauren Reiter

45. DESIGNING OUTDOOR SPACES TO ENHANCE URBAN INTER-GENERATIONAL LIVING
Jordan Albers

46. INTERSTITIAL SPACE TO PROMOTE HEALTH IN INTER-GENERATIONAL LIVING ENVIRONMENTS
Sara Hartman

47. INTER-GENERATIONAL LIVING: OPEN BUILDING ARCHITECTURE AND THE IMPORTANCE OF CHOICE & INDEPENDENCE
Ian Kilpatrick

48. CREATING A HEALING SENSE OF PLACE THROUGH INTER-GENERATIONAL LIVING
Wilson Meeks III

49. SILENT ARCHITECTURE: HEALING IN AN INTERGENERATIONAL LIVING ENVIRONMENT
Katie Nightingale

50. DESIGNING CIVIC SPACES WITH SOCIAL MEDIA
Mitchel Loring

51. MEASUREMENT OF BUILT ENVIRONMENT THAT SUPPORT PHYSICAL ACTIVITY IN LOW-INCOME COMMUNITIES
Yijing Li

52. PROSODY IN CHILDREN WITH ASD IN NARRATIVE AND FIGURATIVE CONTEXTS
Maria Baker

53. ATTRIBUTION OF RESPONSIBILITY IN THE MEDIA COVERAGE OF NUCLEAR ACCIDENTS
Maria Komarova

54. SOCIAL IDENTITY, THEMES OF BLAME, AND CREATING SOCIAL MOVEMENT MOMENTUM: REMEMBRANCE AND ANALYSIS OF THE "MONTANA CASE"
Sarie Norval

55. DISCLOSURE OF DEPLOYMENT AND TRAUMA EXPERIENCES IN MILITARY COUPLES: IMPACT ON INDIVIDUAL AND RELATIONSHIP FUNCTIONING
Kali Summers

56. RESILIENT COMMITENT: DESIGNING A SCALE TO MEASURE THE DEVELOPMENT OF COMMITMENT IN YOUNG ADULT ROMANTIC RELATIONSHIPS
Scott Sibley

57. RISK FACTORS FOR SPOUSE ABUSE IN THE MILITARY: A META-ANALYSIS
Erika Smith

58. CARING FOR CAREGIVERS: A STUDY OF ONLINE SUPPORT GROUPS FOR ALZHEIMER'S CAREGIVERS
Kathryn Mayes

59. THE EFFECTS OF ENRICHMENT AND SOCIAL ISOLATION ON FLUOXETINE-INDUCED FORCED SWIM TEST BEHAVIOR IN MALE RATS
David Arndt

60. A MODERATE DOSE OF AMPHETAMINE FAILS TO EVOKE FM 50 KHZ ULTRASONIC VOCALIZATIONS BUT INDUCES PSYCHOMOTOR HYPERACTIVITY
Erik Garcia

61. THE ROLE OF THE NR2B SUBUNIT IN THE ACQUISITION OF FEAR IN DIFFERENTIALLY REARED RATS
Emily K. Reinhardt

62. THE SEATED INACTIVITY TRIAL (S.I.T): PHYSICAL ACTIVITY OUTCOMES ASSOCIATED WITH EIGHT WEEKS OF IMPOSED SEDENTARY BEHAVIOR
Brooke Cull

Interdisciplinary

63. CONTROLS ON BIOGENIC METHANE FORMATION IN CHEROKEE BASIN COAL BEDS, KANSAS
Brien Wilson

64. EVAPORATIVE CONCENTRATION, DISSOLVED ORGANIC MATTER DEGRADATION AND SULFATE REDUCTION AS CONTROLS ON ARSENIC MOBILITY IN GROUNDWATER OF THE OKAVANGO DELTA, BOTSWANA
Hersy Enriquez

65. FLUE GAS DESULFURIZATION WASTEWATER TREATMENT USING CONSTRUCTED WETLANDS
Jose Paredez

66. ENVIRONMENTAL IMPACT OF BIOFUELS PRODUCTION: THE CASE OF NORTHEAST, WEST CENTRAL AND CENTRAL KANSAS AGRICULTURAL DISTRICTS
Sumathy Sinnathamby

67. WATERSHED DELINEATION AND PAIRED WATERSHED SELECTION: FORT RILEY MILITARY INSTALLATION, KANSAS
Muluken Muche

68. INCORPORATION OF SWEET SORGHUM JUICE INTO CURRENT DRY-GRIND ETHANOL PROCESS FOR IMPROVED ETHANOL YIELDS, ENERGY SAVING, AND WATER EFFICIENCY
Nana Baah Appiah-Nkansah

69. GREENHOUSE GAS FOOTPRINTS OF TWO NON-LEGUME COVER CROPS FOLLOWING WINTER WHEAT
Megan Brown

70. A META-ANALYSIS OF RELATIONSHIP FACTORS IMPACTING COUPLES WITH IPV
Bryan Cafferky

71. ENCOURAGING THE ADOPTION OF E. COLI CONTROL AND PREVENTION STRATEGIES: ANALYSIS OF AN ONLINE TRAINING INTERVENTION
Joseph Chapes

72. A NONLINEAR CONTROL SCHEME FOR EXTREMUM POWER SEEKING IN WIND TURBINE ENERGY CONVERSION SYSTEMS
Fariba Fateh

73. GROWTH OF HBN USING METALLIC BORON: ISOTOPICALLY ENRICHED 10BN FOR NEUTRON DETECTION
Tim B. Hoffman

74. TRANSFER BOND TEST USED TO PREDICT TRANSFER LENGTH OF CONCRETE RAILROAD TIES
Joseph R. Holste

75. VALIDATION OF WASHING TREATMENTS TO REDUCE PATHOGENS IN FRESH PRODUCE
Keyla Lopez

76. A FOUR PLEX REAL-TIME PCR ASSAY FOR THE DETECTION AND QUANTIFICATION OF *Escherichia Coli* O157 IN CATTLE FECES
Lance W. Noll

77. IMPACT OF NITROGEN RATE ON NITROUS OXIDE EMISSIONS AND LIFE CYCLE GREENHOUSE GAS EMISSIONS IN SWITCHGRASS-BASED CELLULOSIC ETHANOL
Andrew McGowan

78. STUDY OF THE FEASIBILITY OF USING COMBINED GLASS PARTICLE SIZES AND TYPES IN CONCRETE AS PARTIAL CEMENT REPLACEMENT
Mohammadreza Mirzahosseini

Graduate Interdisciplinary

SEQUESTRATION OF SELENIUM IN FLUE GAS DESULFURIZATION WASTEWATER USING A CONSTRUCTED WETLAND TREATMENT SYSTEM

Madhubhashini B. Galkaduwa[1], Ganga M. Hettiarachchi[1], Gerard J. Kluitenberg[1], and Stacy L. Hutchinson[2]
[1]Department of Agronomy, College of Agriculture; [2]Department of Biological and Agricultural Engineering, College of Engineering

BACKGROUND AND PURPOSE: Flue gas desulfurization (FGD) technology is commonly used in coal-fired power plants to minimize sulfur dioxide emission. The quality of wastewater generated by FGD systems can be compromised due to enrichment of trace elements such as selenium (Se) and many other constituents. Therefore, constructed wetland treatment systems (CWTS) are being used to improve the quality of FGD wastewater. **OBJECTIVES & METHODS:** Our objectives were to: (1) study fate and transport of Se in CWTS soil materials using a continuous flow-through column system, (2) understand the role of drying and re-wetting conditions on Se mobility, and (3) gather mechanistic information on Se sequestration by determining speciation of Se using sequential chemical extraction (SCE), and synchrotron based x-ray spectroscopic techniques. **RESULTS & CONCLUSIONS:** There was no Se detected in effluent samples collected during 100 days of feeding (bottom-up) with wastewater and an additional 100 days of flushing with river water. This suggests that Se was strongly retained by soil materials. Also, Se was only sequestrated in the bottom (first) part of the soil columns indicating that Se mobility in soil materials was limited. However, effluent samples from dried and re-wetted columns did contain some Se. Therefore, some retained Se can be remobilized by changing redox conditions. Bulk-XANES and spatially-resolved, micro-scale-XRF and -XANES data showed that most sequestrated Se were in reduced forms. In addition, flushing with river water for an additional 100 days resulted in further reduction of Se. These results were also supported by Se fractionation results obtained from the SCE.

X-RAY SPECTROMICROSCOPY STUDIES OF INTACT SOIL MICROAGGREGATES FROM A TROPICAL LONG TERM AGROECOSYSTEM

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BACKGROUND AND PURPOSE: Microaggregates are recognized as repository of the most stable organic carbon (C) pool in soil. Biochemical recalcitrance, chemical stabilization, and physical protection are the three main mechanisms which involve in protection of C in soil. The objectives of the study were to image C and other relevant elemental distribution in intact soil microaggregates to study micro-scale associations and interactions of soil C, soil biota, and soil minerals within soil microaggregates; and the SOC chemistry and aggregate mineralogy. **METHOD:** Oxisols which had been under tillage with complex crop rotation for 27 years were collected from Center of Experimentation and Research FUNDACEP in Cruz Alta – RS, Brazil. Free soil microaggregates (150-250 µm) were isolated and saturated with e-pure water for 18 hours using a humidifier followed by shock freezing in liquid nitrogen. Then, 100 nm ultrathin sections were obtained using a cryo-ultramicrotome. NEXAFS-STXM analyses were performed at the Advanced Light Source, Berkeley (beamline 5.3.2) at K- and L- edges of C and other environmentally relevant elements. **RESULTS/FINDINGS:** Thin section was rich in aromatic and carboxylic/carbonyl-C and amide functionalities. Microbial structures exhibited co-localization of C functionalities and calcium(Ca) whereas organo-mineral interphase showed both Ca and iron (Fe) co-localization with C functional groups, exhibiting possible chemical stabilization of C. Significant correlation between some C functional groups and Fe was observed indicating possible chemical stabilization of organic C in soil aggregates. **CONCLUSION:** ^{13}C NMR, XRD and wet chemical characterization of Fe and Al will also be conducted for the same microaggregate size to link the results to the bulk soil properties.

COMPARISON OF SIMILARITIES AND DIFFERENCES IN ARYLMETHANE DYE DECOLORIZATION BETWEEN PLANTS AND CRUSHED ROOT EXTRACT

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BACKGROUND AND PURPOSE: Arylmethane dyes are one of the major classes of dyes employed in the textile industry and are also used as common laboratory stains. These dyes behave as potential carcinogens if ingested in large concentrations, besides being a major water pollutant. To overcome these issues many approaches involving secretory enzymes have been explored. These are obtained from bacterial consortia, fungi, as well as various plant parts which have known dye decolorization abilities. The goal of our study is to understand the way in which plants decolorize arylmethane dyes under suitable conditions and to identify possible dye breakdown byproducts. **METHOD:** *Arabidopsis thaliana* and sunflower (*Helianthus annuus*) plants were for two days exposed to two different arylmethane dyes, Brilliant Blue G (BBG) and Bromocresol Green (BG) with starting concentrations of 40 mg/L each in presence or absence of 1 mM hydrogen peroxide and/or 0.05 mM mediator. Using UV-Visible spectrophotometry and mass spectrometry the percentage decolorization of the dyes under the different additions were calculated and compared. Crushed turnip roots which are well-known sources of the enzymes involved in dye decolorization served as positive control while the dyes without any exposure to plants served as negative control. **RESULTS/FINDINGS:** Presence of hydrogen peroxide and mediator proved to be the best combinations with dye decolorization of nearly 75% for both dyes. BBG was more tightly adsorbed to roots than BG. **CONCLUSION:** *A. thaliana* was more effective in dye decolorization than sunflower. These findings support the potential application of whole plants for field remediation in the natural environmental settings.

STABILIZING LIQUID CHEMICALS USING CO-CRYSTALLIZATION TECHNIQUE

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BACKGROUND AND PURPOSE: Despite their widespread importance, chemicals that are liquids tend to be less stable than most solid substances which can create considerable environmental and cost-related challenges when it comes to handling, transportation and storage. In addition, high vapour pressure and low boiling point are also key features of flammable materials. Perfluoroiodoalkanes represent an important class of compounds that, in addition to being liquids at room temperature are also recognized as persistant organic pollutants (POPs). Consequently, there is a need for simple and convenient methods to stabilize these perfluoroiodoalkanes. **METHOD:** A technique known as co-crystallization was used to stabilize the perfluoroiodoalkanes, where selected perfluoroiodoalkanes were co-crystallized with a series of halogen-bond acceptors through non-covalent interactions. Once crystals were formed they were analyzed using IR spectroscopy, melting point analysis and X-ray crystallography in order to determine their structure and stability. **RESULTS/FINDINGS:** The results suggested that perfluoroiodoalkanes can successfully form co-crystals via halogen bonding with selected acceptors, and this liquid to solid transformation results in much improved stability. The co-crystals are infact, stable under normal environmental conditions for months. **CONCLUSION:** Co-crystallizations of perfluoroiodoalkanes provide a convienent way of stabilizing these liquid chemicals, offering a new technology for reducing their environmental impact and the cost in storage and transportation etc.

MODELING MICROBIAL IRON REDUCTION: EFFECT OF FULVIC SUBSTANCES

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BACKGROUND AND PURPOSE: Reductive dissolution of arsenic (As)-iron (Fe) minerals strongly affects the groundwater quality. Arsenic (As) sorbed on mineral surfaces, is naturally occurring metalloid of major health concern to millions of people in the world, especially in the Bengal Basin where tens of millions of people are drinking groundwater with elevated As concentrations. Iron reducing bacteria (FeRB) are known to kinetically favor this process. Humic substances, a class of dissolved organic matter (DOM) compounds, are observed to further enhance this process by serving as electron shuttles. Ultimately, our goal is to evaluate the role of humic substances isolated from groundwater in the Bengal Basin in the mineral dissolution process. **METHOD:** As an initial step, we conducted an electron-shuttling experiment using commercially-available Suwanee River Fulvic Acid (SRFA) and FeRB cultured from natural sediments in Kansas River. Two samples with and without SRFA in acetate medium, dosed with FeRB and control samples without FeRB were prepared. Fe(II) was monitored regularly using Ferrozine method. Process parameters were determined by fitting the experimental data to kinetic model simulating microbial iron reduction. **RESULTS/FINDINGS:** Results indicated faster iron reduction in samples with SRFA. Sensitivity analysis indicated the process is favorable at lower pH (less than 7). **CONCLUSION:** DOM trapped in sediments may have noticable role in release of arsenic in groundwater by enhancing the microbial reductive dissolution of Fe-As minerals. Broader implications of this study are not only limited to understanding process of arsenic release but also have biogeochemical implications related to protecting water resources.

PALEOECOLOGICAL RECONSTRUCTION OF A MODERN SUBALPINE WHITEBARK PINE (PINUS ALBICAULIS) COMMUNITY IN GRAND TETON NATIONAL PARK, WYOMING, USA

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BACKGROUND AND PURPOSE: Whitebark pine (*Pinus albicaulis)* is a critically threatened conifer found in North America. In modern times, it has experienced a significant decline in population due to pine beetle infestations, blister rust infections, fire suppression, and climate change. The purpose of this study was to determine in great temporal and spatial detail the paleoecology of the current stand of whitebark pine trees in the watershed surrounding an unnamed, high-altitude pond in Grand Teton National Park. **METHODS:** This study utilized a variety of paleoecological techniques to produce proxy data which were used to characterize the transformation of the landscape through time. Fossil pollen and charcoal fragments were isolated from a radiocarbon-dated, 155 cm lacustrine sediment core to produce a pollen assemblage detailing vegetation changes through time and a detailed fire history record, respectively. Additionally, a set of 20 increment cores were collected from the modern stand and correlated with PRISM climate data to determine the response of the species to past climate change. **RESULTS:** Synthesis of all proxy data indicate that the modern population of whitebark pine is decreasing due to a combination of anthropogenic fire suppression and increased growing season temperatures. Prior to human influence, the ecosystem experienced frequent, low-intensity fire episodes and colder temperatures, resulting in vegetation more heavily dominated by pine. **CONCLUSION:** Synthesis of all proxy data will provide useful information that will aid conservationists and park managers in their attempt to design magement plans to prevent the extincion of whitebark pine.

EFFECTS ON GROUNDWATER QUALITY FROM SURFACE WATER BODIES ON ARSENIC DISTRIBUTION IN BANGLADESH: GEOCHEMICAL AND HYDROLOGICAL CONTROL

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BACKGROUND AND PURPOSE: Water pollution is one of the major issues in SE Asian countries like Bangladesh where this work is mostly targeted. Much of the groundwater contamination in the Bangladesh is in shallow aquifers that are directly connected to surface water bodies and hence causes changes in groundwater quality. The daily consumption of shallow groundwater containing hazardous concentrations of geogenic arsenic and fecal contamination by over 100 million people in SE Bangladesh are recognized as the cause of a tragic humanitarian disaster. In this research, surface water bodies from specific hydrological setting are monitored in apprehending the hydrological connectivity between surface and groundwaters because it has implications from health, hydrogeochemistry and fecal contamination factors. **METHOD:** Hydrogeochemical analyses, geochemical modeling (MODFLOW) and isotope systematic (Sr^{87}/Sr^{86} and $\delta^{18}O$) are used to understand the relationship of surface and groundwater bodies. **RESULTS/FINDINGS:** It is concluded that shallow wells that are low in As are more likely to be contaminated by fecal indicator bacteria and that rates of diarrheal disease in children are higher if they obtain water from low As wells. **CONCLUSION:** Reversible attachment has important implications for long-distance transport and seasonal patterns of As and microbial contamination but has not been sufficiently investigated at large scale. Thus, it is important to understand how surface water movement affects ground water quality in broader sense.

GEOCHEMICAL QUANTIFICATION AND DETERMINATION OF THE FEASIBILITY FOR CO_2 STORAGE IN KANSAS

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BACKGROUND AND PURPOSE: A class VI permit U.S. Department of Energy site has been proposed for carbon sequestration in south-central Kansas. In an effort to maintain environmental stability, three wells have been drilled to basement rock, two being near the injection site, KGS 1-32 and KGS 1-28, and one being to the western annex, Cutter KGS #1. The western annex site, Cutter, will be utilized as a cross-comparison for mineralogical, geochemical, and structural components to the eastern sites in Wellington. The purpose is to determine the feasibility of CO_2 storage in Kansas. **METHOD:** 11 depths within Cutter have been swabbed, and taken to investigate the chemistry of the subsurface water. The different depths will allow for a quantitative determination of how the brine composition varies with depth, and also provides a baseline for future monitoring. Cores and thin sections were taken from a variety of depths ranging from 3681.9' to 5176.9' (Wellington) and 5564.3' to 7540.2' (Cutter). **RESULTS:** Initial chemical analysis shows a hyper saline brine (50,000-190,000TDS), dominated by Cl, Na, and Ca ions. pH ranges from 6.4 to 7.5, and total alkalinity from 124 and 378 mg/L of HCO_3^-. Dominant mineralogy consists of dolomite with varying forms of silicic intrusions, with sulfide minerals and argillaceous material in between. High porosity and permeability in the injection zone provides an ideal setting for initial CO_2 exposure. **CONCLUSION:** With the potential for 2.7 billion tones of CO_2 to be stored in Kansas, this project could allow Kansas to play a major role in the quest for environmental stability.

HYDROGEOCHEMICALAND SEDIMENT MICROBIAL RELATION STUDIES ON DIFFERENT DEPTH AQUIFER SEDIMENTS FROM MATLAB, BANGLADESH

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BACKGROUND AND PURPOSE: Arsenic (As) poses the greatest hazard towards drinking water quality in Bangladesh. Tubewell drinking water is one of the main sources for household based water options in rural Bangladesh. Our study area is in Matlab Upazila, in Bangladesh. The overall objective of this research is to develop a community based initiative for sustainable As mitigation by developing a sediment color based tool for As mitigation. **METHOD:** Water samples from 10 piezometer nested tube wells and sediments from 2 drill cores (average ~30-800ft depth) were collected. Groundwater was analyzed for understanding the variation of As and other elements and anions like Mn, Fe, PO_4^{3-}, SO_4^{2-}, DO, NO_3^{2-}, NH_4^+ and Cl^-. The cations (As, Ca^{2+}, Mg^{2+}, Na^+, K^+) were also measured in these waters. Microbial DNA was recovered from 8 different depths sediments from the entire length of the South Matlab core. We identified the microbial community composition for a complete depth profile that corresponds with the . **RESULTS**: Shallow depth tube wells are mainly fine to very fine grained sediments and these aquifer sediments are mainly gray to dark gray colored. Intermediate depth sediments are medium to coarse grained sediments which are mainly light gray color. Our phylogenetic tree shows that bacterial communities are related with sediment color, grain size and levels of As contamination in water. **CONCLUSION**: This research allowed us to establish the relation between solid and aqueous phase biogeochemistry and thereby to understand the mineralogical and microbial controls on the nature and kinetics of arsenic release and other contaminants into the associated groundwater.

NOVEL BIOMASS PRETREATMENT METHOD FOR ADVANCED BIOFUELS AND CHEMICALS PRODUCTION

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BACKGROUND AND PURPOSE: Lignocellulose-based biorefineries primarily focus on cellulose-derived sugars using energy-intensive thermo-chemical pretreatment processes to remove lignin. Such processes deteriorate the quality of extracted lignin preventing use for high value applications, produce inhibitors for the fermentation of released sugars and cause environmental problems. Extraction of lignin using green solvents addresses these problems but hydrolysis of pretreated biomass is less effective. Therefore, mild alkaline organic solvents could be an alternative approach for biomass pretreatment. The purpose of this research is to evaluate different alkaline organic solvents as the pretreatment method for different biomass feedstocks. **METHOD:** We evaluated various alkaline organic solvents (DMSO-dimethyl sulfoxide, 2,3-butanediol, glycerol, ethanol, propanol, acetonitrile and water) for the pretreatment of biomass (corn stover, poplar wood, sorghum stalk, wheat straw and big bluestem) and compared with an optimized conventional alkali method (control). **RESULTS AND DISCUSSION:** The primary results showed that DMSO pretreated biomass provided the highest enzymatic hydrolysis efficiency for corn stover and poplar woods. However, the overall sugars yield in corn stover for DMSO was significantly lower than other solvents due to higher mass loss during DMSO pretreatment; this effect was not similar for poplar. The results for sorghum stalk, wheat straw and big bluestem are currently ongoing. Additionally, biomass hydrolyzates will be evaluated as the substrates for 2,3-butanediol fermentation using *Klebsiella oxytoca*. These results will also be discussed at the presentation. **CONCLUSION:** The results from this research will lead to the development of novel biomass pretreatment method that generates clean sugar streams as well as lignin for advanced biofuels and chemicals production.

UTILIZATION OF HEMICELLULOSE-RICH BIOMASS FEEDSTOCKS FOR THE PRODUCTION OF SINGLE CELL OILS

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BACKGROUND AND PURPOSE: Utilization of pentose sugars (e.g. xylose) derived from hemicelluose-rich biomass feedstocks for the production of cellulosic ethanol has been a challenging endeavor. Wild-type strains of the yeast *Saccharomyces cerevisiae* are unable to utilize pentose sugars to produce ethanol. Oleagnious yeast species such as *Lipomyces starkeyi* are capable of converting pentose sugars including xylose into single cell oils (SCOs). SCOs are valuable intermediates that can serve as renewable inputs for many oleochemicals including fuels, polymers, food ingredients, cosmetic additives, and lubricants. Previous work in our laboratory showed that *L. starkeyi* yielded 0.14g SCO/g sugar when using xylose as the major carbon source compared to 0.08g SCO/g sugar for glucose. The ability of *L. starkeyi* to produce high yields of SCOs from xylose may indicate that biomass sources rich in hemicellulose (i.e. xylose) such as wheat bran (25-38%, dry wt.) and corn bran (44-55%, dry wt.) may serve as viable feedstocks for SCO production. The purpose of this research is to develop and test a bioprocess to produce SCOs using corn bran and wheat bran feedstocks. **METHOD:** A factorial design will be used to test the effect of different pretreatment conditions on the hydrolysis efficiency of hemicellulose fractions. Hydrolysates will be used as the substrate for batch-flask fermentation using previously optimized fermentation conditions. **RESULTS/FINDINGS:** Hydrolysis efficiency, substrate uptake rate, cellular growth, SCO production, and fatty acid profiles will be quantified and discussed at the presentation. **CONCLUSION:** The results from this study may have significant economic implications for the development of an industrial SCO bioprocess.

LACTIC ACID BIOSYNTHESIS FROM BIOMASS DERIVED SUGARS VIA *LACTOBACILLUS PLANTARUM* AND *LACTOBACILLUS BREVIS* CO-FERMENTATION

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BACKGROUND AND PURPOSE: Lactic acid has a long history of applications in the food, cosmetic, and pharmaceutical industries. As a monomer of poly-lactic acid (PLA), lactic acid has been receiving intensive attention. Most homofermentative lactic acid bacteria such as *Lactobacillus plantarum* cannot convert pentose sugars (xylose or arabinose) to lactic acid. In contrast, some heterofermentative lactic acid bacteria, for example, *Lactobacillus brevis* have been used to produce lactic acid from xylose. Co-fermentation of lactic acid bacteria may increase the production of lactic acid as well as the conversion efficiency of substrates. The objective of this study was to evaluate the lactic acid production of co-cultured *L.planturam* and *L.brevis* from biomass derived sugars. **METHOD:** Batch fermentation were perfomed using mixture of glucose and xylose and wood hydrolyzate as substrate. *L.brevis* and *L.plantarum* were co-cultured at 37 ºC. **RESULTS/FINDINGS:** Lactic acid yield of 0.92 g/g and productivity of 0.86 g/L/h were obtained from acid hydrolyzed wood via co-fermentation of *L. brevis* and *L.plantarum*. The by-product acetic acid was 3.2 g/L, which was lower than that from cultivation of *L.brevis* alone. **CONCLUSION:** Complete substrate utilizaton was achieved by co-culture fermentation for lactic acid production. Efficient use of both cellulose and hemicellulose derived sugars has the possibility to reduce the production cost of lactic acid for making biodegradable plastics.

Graduate Agricultural Sciences

NITROGEN FERTILIZER SOURCE AND PLACEMENT EFFECTS ON N$_2$O EMISSIONS AND GRAIN YIELD IN NO-TILL CORN
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BACKGROUND AND PURPOSE: Global nitrogen (N) fertilizer use in agriculture is projected to increase, in order to match the increasing demand for food. Agricultural lands that receive N fertilizer are considered to be the main source of N$_2$O, a potent greenhouse gas. Fertilized fields are responsible for 68% of total N$_2$O emissions in the US. Strategies that attempt to better match nutrient availability and plant needs, such as N fertilizer source and placement, and the use of enhanced-efficiency fertilizers, are recognized as means to avoid N losses and increase crop yield. The objective of this study was to assess the impact of N source and placement on N$_2$O and corn grain yield. **METHOD:** The treatments were broadcast urea, broadcast urea ammonium nitrate (UAN), broadcast coated urea, surface-band UAN, subsurface-band UAN, subsurface-band UAN + nitrification inhibitor and a 0 N control. The treatments were arranged in a randomized complete block design with four replicates. The N$_2$O emissions are being monitored using static non-steady state vented chambers. **RESULTS/FINDINGS:** Subsurface-band UAN emitted the most (3.2 kg N-N$_2$O ha^{-1}), whereas control (0.26 kg N-N$_2$O ha^{-1}) and broadcast UAN (0.55 kg N-N$_2$O ha^{-1}) emitted the least. The use of nitrification inhibitor decreased N$_2$O emissions by about 66%. The highest grain yields were obtained with subsurface-band UAN (10.5 Mg ha^{-1}) and surface-band UAN (9.8 Mg ha^{-1}). **CONCLUSION:** Accounting for both total N$_2$O emitted and grain yield, surface-band UAN resulted in the best performance. Fertilizer source and placement management have the potential to both mitigate N$_2$O emissions and promote high yields in corn.

EVIDENCE FOR GEOGRAPHICAL ORIGIN BASED POPULATION STRUCTURE AND GENETIC DIVERSITY IN SORGHUM ACCESSIONS WITH DIFFERENTIAL RESPONSE TO GRAIN MOLD
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BACKGROUND AND PURPOSE: Grain sorghum's enormous genetic diversity has facilitated its flexibility in adjusting to a wide range of environments. One important example is grain mold resistance where accessions evolved under warm and humid conditions tend to express high degree of resistance to the disease. Proper understanding of the genetic architecture of grain mold resistance is important in breeding for resistance. Objectives of this study were to assess the extent to which the observed dynamics of grain mold resistance could be explained by racial diversity and geographical origins of sorghum accessions and to investigate the population structure and genetic diversity among selected resistant and susceptible accessions. **METHOD**: A total of 123 sorghum accessions which comprised 111 unique grain mold resistant sources of various racial categories collected from Pawe and Asosa areas in western Ethiopia and 12 US lines of mixed racial backgrounds were genotyped using 23 sorghum simple sequence repeat markers. Genetic diversity and population structure were analyzed using PowerMarker and STRUCTURE software, respectively. Results obtained were further confirmed by principal component analysis using XLSTAT. **RESULTS AND CONCLUSION:** The diversity analysis grouped Pawe and Asosa collections into separate clusters, while all US lines were grouped in another separate cluster. Population structure analysis identified three subpopulations in this panel which correlated well with the three geographic locations that accessions originated from and was less correlated with racial ancestries. Hence, genetic diversity and population structure of grain mold resistant accessions appear to have mainly been influenced by geographical origins than racial categories.

SHOULD IT STAY OR SHOULD IT GO? POSSIBLE FACTORS INVOLVED IN LESSER GRAIN BORER DISPERSAL BEHAVIOR

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BACKGROUND AND PURPOSE: Grain in storage facilities forms suitable but temporally and spatially discontinuous resource patches in the agricultural landscape for stored-product insects. Insects resident of a particular patch are able to contribute to population grow and eventually to disperse; the colonization of the new patch depends on the ability to reach the surface, move through the environment, and to find a new resource patch. What causes stored-product insects to disperse from stored grain is not well understood but this process is critical for population persistence and colonization of new resource patches. This research project is focused on the dispersal behavior of the lesser grain borer, *Rhyzopertha dominica*. We will address the question: what conditions, both internal and external, cause lesser grain borers to go to the grain surface and initiate dispersal flight? **METHOD:** To address this question we measured the movement of individual lesser grain borers in a mono-layer of wheat to determine when they move to the grain surface. Flight initiation experiments were also conducted to assess variation in flight initiation among populations and the relationship with reproductive ability was assessed using the instantaneous rate of population increase (r_i) of a population recently collected from the field and a population that has been kept in the lab for decades without flight. **CONCLUSION:** These experiments will provide important information regarding what drives lesser grain borers to leave stored grain.

INFESTATION OF SOUND AND ARTIFICIALLY-DAMAGED HARD RED WINTER WHEAT KERNELS BY FIRST INSTARS OF THE LESSER GRAIN BORER

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BACKGROUND AND PURPOSE: The lesser grain borer, *Rhyzopertha dominica* (F.), is a devastating insect pest of stored wheat in Kansas and the world. The female adult lays eggs loosely outside wheat kernels. Larvae (first instars) hatching from eggs enter wheat kernels to complete immature development. Very little is known about the site of entry and establishment of larvae within wheat kernels, and the impact of site of establishment of larval development. **METHOD:** In the first experiment, individual, sound, organic hard red winter wheat kernels in glass vials were individually infested with 1, 2, 3, 4, or 5 larvae and held at 28ºC and 65% RH. In the second experiment, wheat kernels damaged with a micro-drill were individually infested with one larva per vial. Infested kernels were dissected 21 days later to determine site of entry and establishment of larvae. **RESULTS/FINDINGS:** At 2-5 larvae per kernel, 20-34% of the kernels (*n*=50) were infested; at one larvae per kernel 12% were infested. Despite variation in percent infestation, differences among larval densities were not significant. About 82-90% of artificially-damaged kernels were infested by larvae in contrast with 12% for sound kernels. In both experiments germ of the kernels was the most preferred site of entry followed by the endosperm and brush end. Larvae infesting the germ area developed faster when compared with larvae in other kernel portions. **CONCLUSION:** These findings indicate that newly-emerged larvae of *R. dominica* preferred germ as the site of entry and establishment, and damaged kernels had higher infestation rates than sound kernels.

EVALUATING THE EFFECTS OF CORN MICRON SIZE IN PELLETED DIETS ON NURSERY PIG GROWTH PERFORMANCE

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BACKGROUND AND PURPOSE: A total of 192 nursery pigs were utilized in a 35-d experiment to determine the effects of corn particle size and pelleting on nursery pig growth performance. Diets were nutritionally similar, manufactured differently in a 2×2 factorial with 2 corn particle sizes (400 µm vs. 700 µm) and two diet forms (mash vs. pelleted). **METHOD:** There were 6 pigs per pen and 8 replications per treatment. Data were analyzed using the GLIMMIX procedure of SAS. **RESULTS/FINDINGS:** There were no effects of corn particle size ($P > 0.24$) on any response criteria or of the interaction on ADG or ADFI ($P > 0.17$). Pigs fed mash diets had improved overall ADG compared to those fed pelleted diets ($P = 0.01$; 0.43 vs. 0.39 kg/d). Pigs fed mash diets had greater ADFI during all periods ($P < 0.02$). Feed efficiency was improved by pigs consuming mash diets compared to those consuming pelleted diets during phase 2 ($P < 0.0001$; 0.57 vs. 0.68), but there were no differences during phase 3 or overall. There was a corn particle size $\times$ feed form interaction, where pigs that were fed pelleted diets made from corn with a particle size of 700 microns had improved overall feed efficiency ($P < 0.05$) compared to pigs fed any of the other three treatments. **CONCLUSION:** This research suggests feed efficiency is slightly improved by feeding 400 vs. 700 micron corn in mash diets, but pelleting does not further improve feed efficiency when corn is ground to a fine particle size.

RESISTANCE OF THREE POWERBAR PACKAGES TO INFESTATION BY THE *PLODIA INTERPUNCTELLA*

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BACKGROUND: Stored product pests are a common post-harvest contamination problem in packaged food products such as powerbars. Infestation of package foods results in food safety issues, quality and product loss, and the potential loss of a consumer. Roughly, 75% of package infestations occur due to insects entering a package resulting from an existing packaging defect such as a tear or seam failure. Manufacturers can take all possible precautions to prevent infestations in their facility, but have little control of their product during transportation and storage on the retail marketplace. **PURPOSE:** The objective of this study was to evaluate three packaging variations to determine which package provides the greatest protection against Indianmeal Moth infestation. **METHOD:** The three powerbar packing variations where challenged with either eggs (low, medium, high density), 50 first instar , 50 third instar, 50 fifth instar, or 2 male and 2 female pupae of the Indianmeal moth, *Plodia interpunctella (*Hübner), and reared at 28°C and 65% RH. Samples were evaluated after 21 days to observe larvae development and 42 days to observe adult development. **RESULTS/CONCLUSIONS:** Results suggest older larvae of the *P. interpunctella* showed a higher propensity of all instar ages to infest all packaging variations. Results from egg and 1st instar challenge studies show a reduction in package pentration abiltiy compared to 3rd and 5th instar. This leads to the conclusion that the later instar stages of the *P. interpunctella* are of greatest concern to package penetration and infesation of powerbars.

NUTRITIONAL ENHANCEMENT OF DRIED DISTILLER'S GRAINS WITH SOLUBLES VIA *SPOROBOLOMYCES ROSEUS* FERMENTATION

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BACKGROUND: Whole stillage and thin stillage from the ethanol process were evaluated as substrate sources for the production of β-carotenes by *Sporobolomyces Roseus* (ATCC28988). This product has the potential to be used as a novel feed ingredient for poultry, swine or cattle diets. β-carotenes have been supplemented in animal diets to improve animal health, enhance meat color and quality and increase vitamin A levels in milk and meat. We have developed a microbial fermentation method to produce these 'natural' β-carotenes from biofuel industry's under-utilized. Currently under investigation is the supplementation of additional protein sources to provide the yeast a more accessible protein source and decrease the overall fermentation time. **METHOD:** Microbial growth kinetics and stillage fermentations were performed in 500-ml baffled shake flasks and in a 5 L bioreactor. HPLC method was used to analyze and quantify the β-carotenes. A 50 L bioreactor has been specifically designed to evaluate the scalability of the process and to perform subsequent feed trails. **RESULTS:** Final β-carotene concentration for the whole stillage and thin stillage were 167.7 ± 2.06 μg β-carotene/g biomass and $131.5\pm.80$ μg β-carotene/g biomass, respectively. The resulting product can be effectively blended with regular feed to generate a premium nutritionally enhanced feed product **CONCLUSION:** Both whole stillage and thin stillage were shown to be excellent candidates for a novel feed ingredient fermented to contain a natural source of β-carotene. They represent two distinct products that can be added as a dry ingredient during feed mixing or as an liquid fat source during mixing or after diet pelleting.

EFFECTS OF UVB RADIATION ON INTUMECENCE DEVELOPMENT IN *IPOMOEA BATATAS*

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BACKGROUND: Intumescences are a physiological disorder that develops on plant tissue and is characterized by rapid cellular swelling and possibly division. Ultimately, this disorder results in the death of the affected tissue. While it is currently unknown what causes this disorder, previous observations and research suggest that light quality and quantity in which plants are exposed may be a factor in development. The purpose of this study was to observe the effects of UVB radiation on intumescence development in ornamental sweet potato vine (*Ipomoea batatas*), with the hypothesis that a lack of UVB radiation is resulting in this disorder. **METHODS**: Two sweet potato vine cultivars, 'Blackie' and 'Ace of Spades,' were grown under light treatments that included 1) normal greenhouse production conditions; 2) supplemental UVB lighting; 3) supplemental UVB lighting with Mylar® sleeves over the lamps to block all UVB radiation; and 4) control lighting with full spectrum lamps. Treatments were administered for two weeks, and the experiment was repeated twice. **RESULTS AND CONCLUSIONS:** The addition of UVB radiation significantly reduced the occurrence of intumescences when compared to plants grown under the other light treatments. 'Ace of Spades' was highly susceptible to intumescence development, while 'Blackie' was found to be less susceptible to the disorder. These findings show that supplying UVB to susceptible plants can be an effective preventative measure for intumescence development. Additionally, varying degrees of intumescence susceptibility among cultivars underscores the role of genetics in its occurrence.

SCREENING FOR STALK ROT AND DROUGHT TOLERANCE: TOWARDS ENHANCED SORGHUM PRODUCTIVITY

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BACKGROUND AND PURPOSE: Stalk rots are key biotic stresses of sorghum [*Sorghum bicolor* (L) Moench]. Drought is the most critical abiotic stress. Identification of superior lines tolerant to both stressors and incorporating them into breeding programs is important to enhance productivity. The objectives of this study were to screen 38 exotic lines and 8 checks to identify sources of resistance/tolerance for both stressors and to develop an aggregate performance index (*Index_{AGP}*) that enables lines to be ranked based upon their relative tolerance to both stressors. **METHOD:** Plants established in the field were inoculated with *Macrophomina phaseolina* and *Fusarium thapsinum* at 14 days after flowering. At harvest, plants were screened for disease severity using plant height, stalk diameter, lesion length, number of diseased nodes, 100-seed weight and total seed weight per panicle. Three physiological traits (leaf temperature, chlorophyll content and chlorophyll fluorescence) were measured as drought tolerance indicators at 74, 84 and 94 days after planting (3 census dates). Six mathematical equations were developed to derive *Index_{AGP}*. **RESULTS AND CONCLUSIONS:** Wide variation was observed for all measured traits demonstrating the genetic diversity among tested lines. The effect of pathogen treatment was significant for majority of the disease severity traits. The line and census date had highly significant effects on all physiological traits. *Index_{AGP}* facilitated the identification of better performing lines in relation to both stressors when compared with checks, disclosing their potential as parental materials for high quality hybrid production. *Index_{AGP}* could provide the conceptual framework to breeders for concurrent evaluation of lines against stalk rots and drought.

PRODUCTION OF DIMETHYLFURAN FROM HYDROXYMETHYLFURFURAL, A BIOMASS DERIVED PRODUCT, USING A CATALYST COATED POLYMERIC MEMBRANE REACTOR
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BACKGROUND AND PURPOSE: Catalytic membrane reactors afford an efficient method for performing three-phase heterogeneous chemical reactions. In this study a polymeric membrane is coated with a noble metal catalyst and positioned to act as an interface between a liquid and gas phase allowing gas transport while restricting the liquid. This design has the potential to utilize hydrogen pressures of a few atmospheres as compared to traditional heterogeneous reactors for hydrogenation that require orders of magnitude higher hydrogen pressures. This study examines the capability of this reactor design for hydrogenation/hydrogenolysis reactions and explores the reaction kinetics and the influence of reaction temperature and gas phase pressure on system performance. **METHOD:** An integrally-skinned, asymmetrical polyimide membrane was produced and employed as the phase contactor. This report details the hydrogenolysis of 5-hydroxymethylfurfural, a biomass based platform chemical, to 2,5-dimethylfuran, a potential liquid fuel. Studies relating to membrane stability and compatibility with various reaction solvents and under various reaction conditions are also underway. **RESULTS/CONCLUSIONS:** Materials compatibility studies have shown that polyimide membranes are stable in water, low molecular weight alkanes and in lower alcohols. Consequently, water has been selected as the reaction solvent for the HMF to DMF transformation. Initial studies demonstrate that the membrane reactor system promoted the hydrogention reaction. If the reactor system is shown to produce significant conversion of HMF while maintaining long-term membrane stability and performance, the hydrogenolysis reaction of HMF to DMF using a catalyst coated polymeric membrane may serve as a model reactor/reaction for several other biorefinery operations.

USING D-D FUSION NEUTRONS FOR MATERIAL INTERROGATION FOR THE HOMELAND SECURITY PURPOSES
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BACKGROUND AND PURPOSE: Dense Plasma Focus (DPF) is a Pulsed Power device, capable of producing short-lived, hot and dense plasma($\sim 10^{19} cm^{-3}$) through a fast compression of plasma sheath. The device can provide intense burst of 2.5MeV neutrons when operated in deuterium through fusion reaction $^2H(d,n)^3He$. The 2.5MeV neutrons interact elastically with materials, the scattered neutrons from different materials give different responses. **METHOD:** The DPF machine was filled with deuterium gas at pressure 4mbar, the device produces about $4.0 \times 10^7 N$/pulse. different targets have been placed in front of the source at distance of 40 cm. Plastic scintillators BC-418 have been used to measure the direct and scattered neutron. The neutron source and the detectors have been shielded with lead, stainless steel, and polyethylene in certain way to shield against the x-rays and neutrons. **RESULTS/FINDINGS:** The scattered neutrons from different targets have been measured, the materials with high content of hydrogen (water and polyethylene) give the lowest response. Materials with higher atomic weight like Aluminum were found to give high response. Some compound materials like sand and chalk give high response but lower than Aluminum. The materials which are explosive-like with nitrogen content give a response slightly above the lower ones. **CONCLUSION:** the 2.5MeV neutron scattering from different materials were found to be a valuable way to discriminate between materials, it shows that explosive like materials may be distinguished from other inert materials. This method may be combined with other methods to give more clarification about dangerous materials in airports or on the borders or even for unknown suspicious ones.

X-RAY INTERROGATION OF MATERIALS USING DENSE PLASMA FOCUS FOR HOMELAND SECURITY

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BACKGROUND AND PURPOSE: Material interrogation is important nowadays for the homeland secuirty purposes. A lot of researches have been done in this field to find an effitive way to detect harmful materials, like explosives and drugs. X-ray detection methods are the most common to be used in this field. Many ways have been developed using X-rays like radiography, dual energy X-ray, scatter immaging and 3D imaging. In this work we are using a maching called dense plasma focus to be the X-ray source for material interrogation. The dense plasma focus is a pusled power machine cabable of producing many types of radiations, X-rays, neutron, Ions and electrons, in a very fast time, few tens of nanoseconds. **METHOD:** Taking the advatntages of the fast X-ray emission from the machine, different materials in different sizes have been interrogated. The scattered X-ray from the material has been measured by two Photomultiplier tubes each one is coupled with Sodium Iodide, NaI, scintillator. MCNP simulation has been done to simulate the situation. **RESULTS/FINDINGS:** Analyzing the scattered X-ray signals from the target showed reasonable agreement with the simulation. Nitrogen rich materials can be distinguished from inert materials to some extend. **CONCLUSION:** Dense plasma focus machine gives a very fast way for material introgation which will be helpful at the boarders of the country. Consequently, reducing the time required to investigate thousands of tagets every day. Moreover, it reduces the radiation dose that people working around will get.

PLEISTOCENE TO HOLOCENE MAFIC VOLCANISM IN THE UPPER WIND RIVER BASIN, WY

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BACKGROUND AND PURPOSE: The Yellowstone volcanic field is one of the most hazardous volcanic systems in the world, characterized by three cycles (2.1, 1.3, and 0.64 million years [myr] ago) of voluminous explosive rhyolite eruptions. The timing of postcaldera magmatism is important for hazard assessment because it influences calculations of magma chamber longevity and eruptive cycles. Near Dubois, WY, preliminary work by others has identified igneous rocks (lavas and shallow intrusives) that are likely related to Yellowstone magmatism. Existing research on these rocks is extremely limited. My goals are to determine whether the magmatic centers in Dubois are related to each other temporally/genetically and if they are related to Yellowstone. **METHOD:** 1:6000 scale geologic mapping, sample collection, geochronology, and whole rock geochemistry/isotope data will be used to test these hypotheses. 20-25 samples total will be analyzed for major and trace elements using XRF (X-ray fluorescence). Several samples will be dated by 40Ar/39Ar geochronology. Their bulk Sr-Nd-Pb isotope composition will obtained. **RESULTS/FINDINGS:** Initial geochemical results indicate the samples range from basalt to andesite, and some are fairly primative. **CONCLUSION:** The combined data sets will be used to document how or if the local magmatism relates to the Yellowstone volcanic field and how the magmas formed.

PETROLOGIC CONSTRAINTS ON CAMBRIAN AGED FLOOD BASALT VOLCANISM IN THE SOUTHERN OKLAHOMA AULOCOGEN

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BACKGROUND AND PURPOSE: Large Igneous Provinces (LIPs) include formations of voluminous mafic volcanic lavas produced through eruptions of very large magnitudes over relatively short time periods, formed from either mantle plumes or continental rifting. In the Wichita and Arbuckle Mountains of the Southern Oklahoma Aulocogen (SOA), Cambrian aged basalts have been found in deep well cuttings. These rocks are poorly understood because none of these materials are exposed at the surface. The goal of this study is to use petrologic and geochemical analyses to obtain a better understanding of the magmatic processes that formed the LIP that includes the subsurface rocks. **METHOD:** Samples have been collected from four wells and will be prepared for bulk XRF analysis for major and trace element compositions, and whole rock Sr, Nd, and Pb isotope compositions. **RESULTS/FINDINGS:** This combined dataset will be used to compare the SOA to other mafic LIPs, as a way of understanding what type of volcanism was present at the time of the SOA formation (e.g., did the magmatism result from a mantle plume head or a large rifting event). **CONCLUSION:** If this work shows that there was a flood basalt event, it may lead to a possible understanding of mass extinction events and past climate changes as they have been linked to flood basalt events. Overall, this project is just the beginning of what could benefit the scientific community, since the more that is discovered about the SOA will provide geochemical and petrologic understanding of a relatively unstudied region.

JARBIDGE RHYOLITE IN NORTHEASTERN NV: RELATIONSHIPS BETWEEN THE CENOZOIC EVOLUTION OF THE NORTHERN GREAT BASIN AND THE YELLOWSTONE HOTSPOT

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BACKGROUND AND PURPOSE: During the mid-Miocene northeastern Nevada was characterized by voluminous volcanism and prevalent extension and basin development, including widespread occurrences of porphyritic silicic lavas (e.g. Jarbidge rhyolite). $^{40}Ar/^{39}Ar$ geochronology indicates Jarbidge Rhyolite volcanism initiated ca. 16.7 Ma near Wild Horse Reservoir, was active at Bear Creek Summit ca. 15.8 Ma (Callicoat, 2010), and potentially gets younger to the east to the UT border based on prior work by others. However, no chemical or geochronologic information actually exists that verifies these lavas in northeastern Nevada are actually Jarbidge rhyolite and they have only been mapped at a reconnaissance, regional level. Thus, their relationship to potentially coeval faulting and sedimentary basin development is unclear. As a result, the purpose of this study is to document the physical, chemical, and chronologic characteristics of Jarbidge rhyolite in northeastern NV. **METHOD:** Major and trace element geochemistry of samples were obtained via XRF at Franklin & Marshall College. These data will be used to: [1] fully characterize the Jarbidge Rhyolite in the study area, [2] geochemically compare Jarbidge Rhyolite in the study with those lavas studied by Callicoat (2010). **CONCLUSION:** This study provides a temporal link between Jarbidge Rhyolite volcanism in NV, regional extension, and the inception of the Yellowstone hotspot, as well as identifies its spatial connection to other mid-Miocene silicic magmatism that has been associated with the Yellowstone hotspot.

AN INVESTIGATION INTO THE EFFECTS AND IMPLICATIONS OF GAMMA RADIATION ON ORGANIC MATTER, CRUDE OIL, AND HYDROCARBON PRODUCTION

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BACKGROUND AND PURPOSE: There are five regimes in an organic source bed for hydrocarbon generation. Those regimes include the atmosphere or gases, biosphere or organic material, lithosphere or mineral matrices, hydrosphere or water, and the ergosphere or energy from temperature and radioactive decay. The current idea of hydrocarbon production only involves heat energy from temperature increase due to burial but does not include the significant energy generated from the radioactive decay of isotopes, U, Th, and K, commonly found in abundance in these hydrocarbon source beds. The purpose of this study is to investigate the effects of γ-rays on crude oil, organic material, and hydrocarbon production to better understand the role radiation plays in hydrocarbon systems. **METHOD:** Crude oil will be irradiated with γ-rays and the changes in the materials will be evaluated with comparison to control specimens. The samples will be analyzed using FTIR and GC-MS in order to determine these changes. **RESULTS/FINDINGS:** When irradiated, it was determined quantity of CH_3 groups decreased and the quantity of CH_2 groups increased suggesting the combining of small chains into longer chains along with the production of $H_2(g)$. **CONCLUSIONS:** These results suggest that by radiolysis, light oil can become heavier due to radioactive decay. Future studies include adding $H_2O(l)$ to the system to determine if H_2O, or the radicals formed, act as catalysts and a H supply in the natural environment which hydrocarbons form. These experiments are a stepping stone in showing that radioactive decay plays an important role in hydrocarbon production.

CORRELATION OF MARINE TERRACES USING LUMINESCENCE DATING TECHNIQUES TO TEST QUATERNARY SLIP RATE ESTIMATES OF THE NORTHERN SAN ANDREAS FAULT

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BACKGROUND AND PURPOSE: The San Andreas Fault is predominantly strike-slip with right-lateral movement exposing and displacing Quaternary marine terraces. U-series analyses of coral from two locations along the Northern California coast give an approximate age of 80,000yr B.P., which is consistent with the marine oxygen isotope stage 5a chronology. Earlier work investigated the area using optically stimulated luminescence (OSL) from quartz minerals and a single-aliquot regenerative-dose (SAR) approach to date similar localities; resulting data suggest that either the quartz OSL may have reached dose-saturation levels, or that the quartz luminescence was incompletely bleached prior to deposition. The pIRIR$_{290}$ technique for feldspars has returned accurate ages up to 600 ka and in suitable low-dose environments, up to ~1 Ma. This project will investigate and apply alternative luminescence dating approaches, including pIRIR$_{290}$ dating of feldspar minerals using SAR protocols, to correlate the 5a marine terrace to the south and north of the San Andreas. **METHOD:** Because natural OSL signals are light-sensitive, samples are gathered and stored in darkened tubes with covered ends. In a dark lab, samples are prepared using physical and chemical processes to isolate K-feldspar grains. Prepared samples are analyzed using pIRIR$_{290}$ protocols. **RESULTS:** Ages calculated using pIRIR$_{290}$ protocols will correlate the Point Arena Terrace across the fault; and, in doing so, allow inference of Quaternary slip rates. **CONCLUSION:** Preliminary results suggest the Point Arena Terrace is older than calculated from previous quartz OSL analysis, advocating an older upper limit for feldspars, and success of pIRIR$_{290}$ protocols. Data will be discussed in presentation.

EFFECT OF CALF GENDER ON MATERNAL MILK PRODUCTION AND COMPONENTS IN HOLSTEIN COWS

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BACKGROUND AND PURPOSE: Research in some animal models has indicated that progeny gender may influence milk production and composition in the ensuing lactation. **METHODS:** Data from 1995-1999 were obtained from Dairy Record Management Systems and analyzed with the MIXED procedure of SAS, with the fixed effects of calf gender (CALFSEX), lactation number (LACTNO), and use of bovine somatotropin (BST), and the random effect of year. Only Holsteins with lactations that began with a single female or male calf were included in analysis. If BST use was reported in any of the first five test days of a lactation, the lactation was considered BST positive. Response variables analyzed were whole-lactation milk (305MILK; $n = 2,892,338$), fat (305FAT; $n = 2,591,225$), and protein (305PROT; $n = 2,572,488$) production, peak milk production (PEAK; $n = 1,049,504$), and average somatic cell score (SCC; $n = 2,796,955$). **RESULTS AND FINDINGS:** Cows beginning a lactation with the birth of a female had greater ($P < 0.01$) 305MILK (8,172 *vs.* 8,064 kg), 305FAT (295.56 *vs.* 291.46 kg), 305PROT (258.78 *vs.* 255.61 kg), and PEAK (36.97 *vs.* 36.36 kg/d) but lower SCC (3.29 *vs.* 3.32) than cows with male calves. This difference due to calf gender was eliminated by BST except in first parity (8,681 vs. 8,631 ± 71 kg, $P < 0.05$). **CONCLUSION:** Results indicate that cows that have female calves may produce more whole-lactation milk and components, but that cows with male calves may compensate for this difference if BST is administered.

DOES FOOD ABUNDANCE AFFECT WITHIN-SEASON DISPERSAL OF MALE GRASSHOPPER SPARROWS?

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BACKGROUND AND PURPOSE: Grassland birds are declining throughout North America, likely due to a variety of factors including habitat loss and degradation. The grassland-obligate Grasshopper Sparrow (GRSP; *Ammodramus savannarum*) is declining at 3% per year, including in their core breeding range in the Flint Hills of Kansas. During the 2013 breeding season, we observed that many GRSPs dispersed several kilometers within our 3,487-ha study area at the Konza Prairie, presumably between nesting attempts. Consequently, patterns of GRSP relative abundance changed dramatically over the breeding season. We hypothesized that birds may disperse between nesting attempts due to spatial differences and temporal changes in relative food abundance on plots managed with different land use. If food explains these movements, we predicted that densities of birds would be associated with higher food intake rates as measured by triglyceride (TRIG) concentrations in plasma. **METHOD:** We captured and blood-sampled >200 male GRSPs between May-July 2013 on 18 plots managed with cattle, bison, or no grazers, and burn frequencies of 1-3 years. **RESULTS AND CONCLUSION:** Preliminary results indicate that birds foraging on plots not burned in 2013 had lower TRIG concentrations than did birds in unburned areas, independent of burning or grazing regime. However, contrary to prediction, TRIG concentrations were unrelated to densities of territorial males, suggesting that dispersal movements may not be driven by simple spatial differences in food availability. Future studies quantifying the temporal and spatial patterns of food abundance directly will help determine the consequences of different land management regimes on grassland bird movements and habitat quality.

A COMPARATIVE STUDY ON THE DISTRIBUTION OF ADULT *DECTES TEXANUS* IN CONTINUOUSLY PLANTED SOYBEAN FIELDS

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BACKGROUND AND PURPOSE: The soybean stem borer, *Dectes texanus* Leconte (Coleoptera: Cerambycidae) is a species native to North America that has recently become an important pest in soybean (*Glycine max* L.). It's common for growers to continuously plant soybean without rotating to other crops, which can increase the liklihood of reinfestation within their soybean field by the soybean stem borer. Monitoring adult densities within a field during times of peak activity is useful for determing the utility of site-specific management practices; however, it is also imperative to understand year-to-year variability in adult distribution within continually planted soybean. Therefore, the objective of this study was to examine the within-field spatial distribution of adult *Dectes texanus* within a season and between multiple growing seasons. **METHODS:** A single soybean field infested with *D. texanus* was selected for modeling the spatial distribution of adults for two consecutive years (2012 and 2013). Geostatistical software was used to create a sampling grid (69 sample points). Each waypoint was sampled using a sweep net by performing 20 sweeps in each cardinal direction at all waypoints within the field. ArcMap was used to interpolate denisties of adult *D. texanus* between sampled waypoints to construct a distribution map within the field. Maps between dates and years were compared. **RESULTS AND CONCLUSIONS:** Preliminary results from 2012 show adult aggregation along edges neighboring previous years soybean crops or edges near alternative plants host before dispersing throughout the field. Changes in spatial patterns between both years and implications from these initial results on current management strategies will be discussed.

IDENTIFICATION OF A G-PROTEIN COUPLED RECEPTOR THAT PLAYS AN IMPORTANT ROLE IN REPRODUCTIVE ISOLATION IN *ALLONEMOBIUS*

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BACKGROUND AND PURPOSE: Postmating, prezygotic (PMPZ) phenotypes, especially those that underlie reproductive isolation between closely related species, have been an important field of study. One of the most important PMPZ phenotypes driving reproductive isolation is the ability of a male to induce egg laying in the female, since it is directly linked to reproductive success. Therefore the question arises: Is there one gene, or a set of genes, that play a role in this PMPZ phenotype, namely the induction of egg laying? **METHOD:** To address this question we utilized a group of crickets (the *Allonemobius socius* complex) whose members are recently diverged and primarily isolated by the induction of egg laying. We did a combined proteomics, bioinformatics approach to identify genes involved in the induction of egg laying. Additionally, we used RNA-interference and backcrossing experiments to functionally analyze the identified genes. **RESULTS/FINDINGS:** Conducting a combined proteomic, bioinformatic approach we successfully identified a G-protein coupled receptor (GPCR) gene, namely *methuselah-like 5* (*Mthl5*) and showed that knockdown of this gene resulted in a reduced induction of eggs laid. To show that this receptor is involved in the egg laying induction pathway we conducted a backcrossing experiment and successfully showed that species-specific allelic variation in *Mthl-5* is directly linked to species-specific patterns of egg laying induction. **CONCLUSION:** We successfully identified a gene that plays an important role in the induction of egg laying and therefore reproductive isolation in the *Allonemobius socius* complex. The next step is to identify the male ligand to this receptor.

DIFFERENT PHYSIOLOGICAL ROLES OF TWO DOPAMINE RECEPTORS IN SALIVATION OF THE BLACKLEGGED TICK, IXODES SCAPULARIS SAY.

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BACKGROUND AND PURPOSE: Ticks are obligatory ectoparasites of many vertebrates and transmit various pathogens that cause numerous diseases, including Lyme disease, the most commonly reported vectorborne disease in the United States. Tick salivary secretions are crucial for successful tick feeding, and include several bioactive components for compromising the host immune responses. Salivation also functions in the removal of excess water and ions after the ingestion of large blood meals. Control of the salivary glands involves dopamine, which is the most potent inducer of tick salivation. Previously, two dopamine receptors were characterized in the salivary glands of the blacklegged tick (*Ixodes scapularis* Say): dopamine receptor (D1) and invertebrate specific D1-like dopamine receptor (InvD1L). Thus, we hypothesized that the two dopamine receptors play different physiological roles in tick salivation. **METHOD:** We used receptor-specific antagonists and agonists, identified in our previous studies, for in vitro assays: monitoring changes in the size of salivary gland acini and quantifying the salivary secretions of isolated salivary glands. **RESULTS/FINDINGS:** We identified differing functions for these two dopamine receptors in tick salivation. 1. D1 receptor triggers fluid transport, presumably by acting on the epithelial cells of the salivary gland acini. 2. InvD1L receptor controls pumping or gating of acini by acting on the myoepithelial cell, which facilitates the expulsion of saliva out. **CONCLUSION:** The knowledge that the two different dopamine receptors act in different steps of tick salivation physiology will lead us to the development of novel methods for the disruption of tick feeding, thus allowing for the prevention of pathogen transmission.

FUNCTIONAL ANALYSIS OF CYTOCHROME P450 GENES IN THE YELLOW FEVER MOSQUITO *AEDES AEGYPI* (DIPTERA: CULICIDAE)

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BACKGROUND AND PURPOSE: Cytochrome P450 monooxygenases (P450s) belong to a heme-thiolate protein superfamily responsible for the metabolism of xenobiotic and endogenous compounds in various organisms. In insects, such as mosquitoes, P450s and other enzymes contribute to the rapid development of insecticide resistance. The purpose of this study was to use RNA interference (RNAi) to reveal the role of four P450 genes (*CYP6AA5*, *CYP6AL1*, *CYP9J32* and *CYP4J16*) in *Aedes aegypti* adults in the defense against three insecticides (permethrin, cypermethrin and deltamethrin). **METHOD:** Double-stranded RNA (dsRNA) corresponding to each of the four P450 genes was synthesized and injected into mosquitoes. Control individuals were injected with GFP dsRNA. After the suppression of the target gene was confirmed by reverse transcription quantitative PCR, mosquitoes were exposed to each insecticide for a short period of time and then transferred to clean cages. The insecticide-treated mosquitoes were fed with 10% sucrose solution and mortality was recorded after 24 hours. Each experiment was conducted with four replicates. **RESULTS:** Our results indicated that among the four genes, only the silencing of *CYP6AA5* increased the mortality of the mosquitoes exposed to cypermethrin compared to the controls. These results suggest that *CYP6AA5* plays an important role in detoxification of cypermethrin but not other two insecticides, and the other genes don't appear to play an important role in detoxification of all three insecticides examined. **CONCLUSION:** The role of P450s in insecticide detoxification is both gene and insecticide specific, and such information can help develop more effective strategies for insect pest management.

INVESTIGATING PROSTAGLANDIN E$_2$ SYNTHASE IN THE BLACKLEGGED TICK, *IXODES SCAPULARIS*

Joshua Urban and Yoonseong Park
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BACKGROUND AND PURPOSE: Ticks are obligatory ectoparasites that feed exclusively on the blood of vertebrates and often transmit a number of pathogens, resulting in substantial economic loss in the animal industry and presenting risks to human health. The blacklegged tick, *Ixodes scapularis,* transmits the most important tick-borne pathogen, *Borrelia burgdorferi*, the causative agent of Lyme disease. Tick salivary secretions contain various bioactive components that aid in the manipulation of hosts' defenses. Ticks secrete large amounts of prostaglandin E$_2$ (PGE$_2$) into the host, where its antihemostatic, anti-inflammatory, and immunosuppressive properties facilitate blood feeding. We hypothesized that ticks possess a PGE2 synthase enzyme, which can be targeted to disrupt tick feeding in the long term. **METHODS/RESULTS:** We have identified and cloned a gene encoding a PGE synthase ortholog (*PGES2*) in *I. scapularis*, which is similar to the mammalian PGES2. The expression pattern and the subcellular localization of PGE2, examined by quantitative reverse transcription PCR and by immunohistochemistry, supports that this gene is expressed in the salivary glands upon blood feeding and constitutively throughout tick feeding. *PGES2* levels were also examined in ticks fed on naive versus immune challenged hosts, exploring the effects of host acquired immunity to ticks on *PGES2* expression in tick salivary glands. **CONCLUSION:** The identification and functional study of *PGES2*, along with the description of its expression patterns, provides critical information into the biosynthetic pathway of PGE$_2$ in tick salivary glands, and opens the door to future studies into the disruption of tick feeding.

CHLORELLA EXTRACT CAUSES FUNCTIONAL DIFFERENTIATION OF INNATE IMMUNE CELLS IN CULTURE AND REGULATES THE GROWTH OF COLON CANCER CELLS

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DUE TO PATENT PENDING, ABSTRACT IS NOT AVAILABLE FOR PUBLIC VIEWING

DEVELOPMENT OF THREE DIMENSIONAL CULTURE SYSTEMS FOR AN EFFICIENT EVALUATION OF ANTITUMOR AGENTS

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BACKGROUND AND PURPOSE: Pancreatic cancer is difficult to diagnose early and responds poorly to therapies currently available. Therefore, development of a method for early diagnosis and an effective therapeutic strategy is urgently needed. Although gemcitabine is an effective chemotherapeutic agent for pancreatic cancer, clinical doses of gemcitabine are often accompanied by severe side effects. Since the three dimensional (3D) cultures of tumor cells mimic tumor growth *in vivo* and require only a short time to complete, we sought to develop a realistic evaluation system for chemotherapeutics and to discover an effective method to reduce the gemcitabine doses without losing therapeutic efficacy for pancreatic cancer treatment. **RESULTS:** Cancer cells cultured in a single layer of 1.5% agar gel, as a base support matrix, in 96 well plate generated cancer cell spheroids on the U-shaped gel surface. In this 3D cell culture system, the growth of PANC-1 human pancreatic ductal carcinoma (PDAC) cells was effectively inhibited by a low dose (~50nM) of gemcitabine when treated 24 hours after culturing, whereas the same PDAC cells were resistant to a several fold higher dose (~200nM) of gemcitabine when treated after the spheroid formation. However, co-treatment with collagenase III significantly enhanced sensitivity of gemcitabine to spheroidal PDAC cells. **CONCLUSION:** Taken together, the current study suggests that agar gel-based 3D cell culture is an excellent evaluation system for chemotherapeutics. In addition, this study implies that co-treatment with proteolytic enzymes offer an effective combination treatment strategy to reduce the dose of gemcitabine without losing therapeutic efficacy.

ASSESSING AND DEVELOPING DEPARTMENTAL RECRUITMENT PROCESSES

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BACKGROUND AND PURPOSE: The Department of Communications and Agricultural Education has not addressed recruitment strategically. Research suggests a direct conversation between the department and recipients of recruitment materials in order to improve the process and assess the value and effectiveness of materials. The purpose of this study was to evaluate recruitment efforts through the following research questions: 1) Are the current recruitment materials effective? 2) How did students find out about majors in the department? 3) What suggestions do the students have for materials? **METHOD**: Focus groups were conducted with students in the department at two levels: 1) Students that transferred into the major, and 2) students who declared their major early enough to receive the materials. Participants were asked a variety of open and closed ended questions to find out which, if any, recruitment materials they remembered, perceived as impactful, introduced them to the major, or needed to be changed. The first set of questions were asked without any prompting or suggesting of specific materials. The second set of questions were asked in conjunction with the presentation of the materials. **RESULTS/FINDINGS**: Results included finding that some materials, such as the holiday card, were effective and should continue, while others, like the Facebook page were not being used effectively. **CONCLUSION**: The results of this research indicate the department should continue to send a holiday card to prospective students, should improve electronic communication, start sending promotional items, and continue evaluating recruitment efforts on a regular basis.

HOW DOES PHENOLOGY AND SEED PRODUCTION OF BIG BLUESTEM (*Andropogon gerardii*) VARY ACROSS THE CLIMATE GRADIENT OF THE GREAT PLAINS? A RECIPROCAL GARDEN APPROACH TO DISTINGUISH ROLES OF SITE AND ECOTYPE

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BACKGROUND AND PURPOSE: Big bluestem, a dominant C_4 grass of the Great Plains, grows across a sharp precipitation gradient. Our main questions: *1) Is there ecotypic variation in seed production?* We predicted ecotypes should have greatest seed production in their home environment. 2) *Is there ecotypic variation in phenology and time to flowering?* We predict that the drought-adapted central KS ecotype will show advanced flowering in response to the shorter growing season and drought. **METHOD:** We investigate seed production and phenology among ecotypes using reciprocal gardens across the precipitation gradient. The three ecotypes (each comprised of four populations in central KS, eastern KS, and Illinois) were reciprocally planted in replicate blocks in Carbondale, IL, and Manhattan, Hays, and Colby KS. **RESULTS/FINDINGS:** Seed production showed strong ecotype, site, and site x ecotype effects. The Illinois ecotype had significantly lower seed production in the drier planting sites, due to inadequate time to reach flowering. First emergence varies by the location, but not by ecotype. All plants in eastern sites emerged earlier than western sites. In contrast, time to flowering varied by both site and ecotype. The central KS ecotype flowered on average 20 days earlier than eastern KS and southern Illinois ecotypes, independent of planting site. Moreover, when planted in Colby, the central KS ecotype was the only one that flowered. **CONCLUSION:** Our results provide clues about how adaptable big bluestem may be in drier climates as well as which are best suited to restore grassland.

DOES MORE REHEARSAL TIME IMPROVE PEOPLE'S ABILITY TO DECEIVE OTHERS?

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BACKGROUND AND PURPOSE: While many studies have been conducted on deception, research that examines the amount of time liars have to prepare their lies is scarce. As Buller and Burgoon (1996) suggest, lying is a cognitively taxing task. Then, it might be the case that the more time individuals have to prepare lies, the better they can successfully deceive others. Littlepage and Pineault's (1984) study indicate that planned lies are more effective than spontaneous ones. This study extends the previous study by examining the link between the time people have to prepare a lie and their success of deceiving others. **METHOD:** Participants will be asked to: 1) Give a one minute truthful account, 2) Give a one minute false account with only 30 seconds to mentally prepare their narrative, and 3) Give a one minute false account with only 3 minutes to mentally prepare. Their responses will be video recorded. The interviews will then be systematically analyzed by the researchers for any non-verbal or verbal behavior patterns that could be truth leakage (indicators of deception) amoung the three groups. **RESULTS/FINDINGS:** Intuition grants that the more time one has to prepare a lie, the better the more successful the lie will be. We anticipate that responses from the 3rd group to have significantly less indicators of deception than the 2nd group. **CONCLUSION:** Our findings could impact the practices of modern interrogation practices, as well as develop future deception research.

INFLUENCING PUBLIC PERCEPTION OF THE NEWS: THE QUESTION OF USER GENERATED CONTENT AND MISATTRIBUTION

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BACKGROUND AND PURPOSE: It is now a common practice for news organizations to encourage readers to post their own comments to articles written by professional journalists, and in many cases, these comments are easily viewable by readers along-side the article. Recent research suggests that this type of practice could have some unforeseen consequences such as readers misattributing the ideas, opinions, and attitudes expressed in these comments to the news article itself. The present research investigates the effects of the user-generated content on people's perceptions of political news. Specifically, we hypothesize that those who read the user comments suggesting a liberal bias in a news article are more likely to perceive a liberal bias in the article. On the other hand, those who are exposed to the user comments suggesting a conservative bias in a news article are more likely to perceive a conservative bias in the article. **METHODS:** Participants in this study (n = 98) were randomly assigned to three groups: a control group and two treatment groups. Each group read the same political news article. Treatment groups were exposed to comments suggesting that the article had either a liberal bias or a conservative bias. Each group was then asked to complete a questionnaire regarding the article and perceptions of the article. **RESULTS AND DISCUSSION:** Initial results confirm both hypotheses. We argue that the ability of user-generated comments to shape perceptions of political news could lead to compromising journalistic integrity and perpetuating the problems of selective exposure and political polarization.

RESEARCH PRIORITIES IN CHILD NUTRITION PROGRAMS

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BACKGROUND AND PURPOSE: School foodservice operations in the United States serve about 32 million meals daily through the National School Lunch program. Through the Child Nutrition Reauthorization Act of 2004, schools implemented food safety programs based on Hazard Analysis Critical Control Point (HACCP) principles. HACCP programs are an effective way to reduce foodborne illnesses. Previous research has identified barriers to implementing food safety and HACCP programs, and the general status of food safety in schools. To maintain and improve food safety practices in schools, research efforts should include insight from practitioners in the school nutrition environment. Prioritized research needs serve to connect practice, science, and application. **METHOD:** In this study, a Delphi technique and survey methodology will be used. The study will include two phases. In the first phase, 51 school nutrition professionals received an online survey asking them to provide their expertise about research priorities for child nutrition programs. Responses from phase one will be organized and emerging themes will be sent out as phase two for professionals to rank in order of importance. If needed, a third phase will be implemented for further clarification. **RESULTS AND CONCLUSION:** While this study is still currently ongoing, the emerging research themes thus far include training and behavior change (which may result from high staff turnover), food product temperature control, customized HACCP plans, outdated equipment and facilities, and cross-contamination with students and food bars.

LIGHTING, VISION, AND AGING IN PLACE: THE IMPACT OF LIVING WITH LOW VISION IN INDEPENDENT LIVING FACILITIES

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BACKGROUND: Due to the growing number of older adults living independently in retirement communities it is increasingly important that interior designers understand the physical and environmental challenges that theses adults face. For adults with age-related low vision and other visual impairments, navigating the built environment can be difficult. However, quality lighting has the ability to help these residents perform daily activities and increase independence. Although independent living facilities have become an attractive housing option, several previous studies have suggested that the lighting levels in such residences are not adequate for low vision users. **PURPOSE:** The purpose for the study was to assess the light levels of specific apartments at Meadowlark Hills in Manhattan, KS, to determine if IESNA (Illuminating Engineering Society of North America) standards for lighting were being met. **METHOD:** Six residents agreed to participate in this study. The two methods for data collection included: light meter readings in targeted areas of their apartment and structured interviews with environmental observation. **FINDINGS:** The results of the study conclude that light levels in the observed apartments do not approximate minimum IESNA standards for senior housing. Although light levels were not adequate, residents' perception of lighting in their apartments was overall positive when they included supplemental lighting sources. **CONCLUSION:** After examining the data recorded from these methods, suggestions are made for current and future improvements of lighting design in these facilities. It is the goal and responsibility of designers to recognize and implement these solutions in order to provide safe housing in which to age in place.

THE ADAPTIVE REUSE OF RURAL SCHOOLS AND THE EFFECTS ON THE COMMUNITY AND QUALITY OF LIFE

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BACKGROUND AND PURPOSE: Access to community amenities is often restricted for rural Americans (Beale & Johnson, 1998; Lapping, 2007). This condition is worsened when rural schools are shut down, causing a detriment to the community's quality of life through the loss of social activities, an economic base, health programs, and an educational center (Diamond, 2013; Richardson, 2000; Lyson, 2002). With rural schools offering a variety of sizes of interior space, there is an opportunity to adapt these spaces for the specific needs of the community (Perkins & Bordwell, 2010; Lachky, 2010). Electing to reuse these spaces is not just a decision that will be sustainable for the building sector, but can also revitalize the rural quality of life. **METHOD:** In order to explore the programmatic requirements for adapting an abandoned school to serve the needs of a community, a qualitative evaluation of literature on rural living conditions, school construction, and existing case studies of successful adaptations was completed. Components vital to successful rural communities and economies were identified as major themes. **RESULTS/FINDINGS:** There are five key components that must be considered when reusing schools: population trends, the growing need for elder care, housing, rural economic policy, and the cost of living. **CONCLUSION:** Based on these findings, a proposed strategy for planning and design optionsfor school reuse is demonstrated to address the established rural issues and contribute to the quality of life for residents. Ideally, these strategies will conserve our planet's limited building resources, and be a model for sustainable community development efforts across the nation.

PERSISTENCE OF BLEED AIR CONTAMINANTS ON HIGH-EFFICIENCY PARTICULATE ABSORPTION FILTERS

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BACKGROUND AND PURPOSE: Most aircraft cabins are air-conditioned and pressurized through the use of bleed air—compressed air taken from the jet engine compressor prior to fuel injection. Fume events, occurring when lubricant from the engine enters the bleed air, can often be harmful to passengers and crew. Since no system currently exists to detect and characterize these events, some have proposed analyzing cabin recirculation high-efficiency particulate absorption (HEPA) filters to detect and identify contaminants. However, a time lapse often occurs before a HEPA filter is replaced or prior to the filter being analyzed. The amount of time that a detectable amount of contaminant persists on the filter after an event has yet to be determined. **METHOD:** Contaminated filter samples will be exposed to similar flow conditions as those of in-use re-circulation filters and analyzed at various intervals of time. Gravimetric measurements will be used to analyze the percentage of the contaminant removed from the filter. Gas chromatograph/mass spectrometry analysis (GC/MS) will be performed to characterize the composition changes of the samples over time. Some contaminated samples will be left in ambient conditions to confirm that contamination lost after removal of the filter is effectively negligible. **RESULTS & CONCLUSION:** Initially, the percentage of contaminant lost seemed to increase steadily but quickly reached a plateau near 3%. Control samples showed minimal loss of contaminant. GC/MS results are pending. The anticipated conclusion is that contaminants persist on HEPA filters long enough to make them valuable source for fume event detection and characterization.

VISUAL CUEING AND FEEDBACK INFLUENCING UNDERGRADUATE STUDENTS' REASONING RESOURCES ON CONCEPTUAL PHYSICS PROBLEMS

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BACKGROUND AND PURPOSE: Research has demonstrated that attentional cues overlaid on diagrams and animations can help students attend to the pertinent areas of a diagram and to facilitate problem solving. We investigate the influence of visual cues and correctness feedback on students' ability to activate and coordinate the cognitive resources to solve physics problems. This research is based upon the theoertical foundations of representational change theory, as well as the cognitive theory of multimedia learning. **METHOD:** Participants (N=90) were enrolled in an algebra-based physics course. Each participant completed an individual interview during which they solved four problem sets each containing an initial problem, six training problems, and a transfer problem. Participants in the cued conditions received visual cues on the training problems. Participants in the feedback conditions were told whether their responses were correct or incorrect. **RESULTS/FINDINGS:** The combination of correctness feedback and visual cueing, was most effective in assisting participants' activation and coordination of appropriate reasoning resources to successfully solve the problems. These results were found both on the training problems as well as on the transfer problems. **CONCLUSION:** These results validate the use of our conceptual model for our experiments, in that they demonstrate that visual cues, together with correctness feedback, can facilitate learners to activate productive knowledge resources from their long term memory to solve physics problems. Furthermore, the results of this study provide proof-of-concept that using visual cues and feedback in online learning systems can potentially improve students' problem solving skills and performance.

IMPACT OF FOOD SAFETY MESSAGES ON CONSUMER FOOD HANDLING BEHAVIORS

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BACKGROUNG AND PURPOSE: Foodborne illnesses affect 48 million U.S. citizens annually. Improper food handling and hygiene practices during meal preparation lead to contamination of the kitchen environment and can result in a foodborne illness. Observational research indicates that some consumers may be knowledgeable about food safety, but safe food handling recommendations are not widely followed. This study was conducted to determine the impact of four key messages (clean, separate, cook and chill) on consumers' food handling behaviors and to measure the spread of microbial contamination from raw meats to ready-to-eat (RTE) foods and the kitchen environment during a typical home meal preparation. **METHOD:** Participants (n=123) were either exposed to the standard messages through a formal presentation, video clips, or were not exposed (control). Participants then prepared a main dish from raw chicken or ground beef and a RTE fruit salad. Activities were video recorded and behaviors scored. Raw meat ingredients were previously inoculated with a non-pathogenic *Lactobacillus casei* culture to track cross-contamination. **RESULTS/FINDINGS:** Approximately 90% of the fruit salads prepared by all participants became contaminated. Hands and kitchen towels were identified as major contamination sources in the kitchen. The group exposed to the four messages via formal presentation demonstrated better hand washing practices than the control group. More risky food handling behaviors were seen among people handling chicken than those handling beef. **CONCLUSION:** Methods of relaying food safety guidance to consumers differ in their impact on consumer behaviors; observational studies utilizing methods to quantify food safety risks must be employed to improve messaging.

SEXUAL PREJUDICE AMONG MIDWESTERN PRE-SERVICE AND IN-SERVICE TEACHERS

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Sexual orientation is only one facet of diversity (Banks et al., 2005), but teacher preparation may not adequately address sexual prejudice (Lamb, 2013). Quantitative results from a mixed methods design will be presented. **BACKGROUND AND PURPOSE:** School environments reinforce heteronormativity (Dean, 2010; Foucault, 1990; Himmelstein & Bruckner, 2011) such that when hate speech or physical violence occur against the non-hetersexual or the transgender student, teachers may not be prepared to respond appropriately. Students victimized because of their gender or sexual variance are more likely to skip school, resulting in lower GPAs; and are less likely to attend college (GLSEN, 2010). How do levels of sexual prejudice differ as a function of demographic, educational, and personal characteristics? **METHOD:** Survey results were collected from pre-service (undergraduate) and in-service teachers (graduate students). Group means of the PREJUDICE scale for each independent variable were analyzed for statistical significance. **RESULTS/FINDINGS:** The total variance of the PREJUDICE scale was accounted for by personal characteristics only (political, 30%; religious, 20%; non-heterosexual friends, 16%; and family members, 12%; participant sexual orientation, 8%; and finishing the survey, 4%). Neither demographic nor educational characteristics accounted for statistically significant differences in group means of the PREJUDICE scale. **CONCLUSION:** We do not accept or reject teacher education candidates based upon their sexual orientation or how many friends and family members they have who are non-heterosexual. Significantly lower levels of sexual prejudice were associated with having non-heterosexual friends and family members or being non-heterosexual, and there were no significant effects from educational interventions.

MULTIRACIAL GRADUATE STUDENTS' LIVED EXPERIENCES IN HIGHER EDUCATION

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BACKGROUND AND PURPOSE: In 1980, the U.S. Census Bureau noted that 7 million people marked "other" on the question of race (Williams, 2003). In 1990, approximately 10 million people marked themselves as "other". In 2000, over 15 million people marked themselves as "other" (Williams, 2003). This "other" group is that of multiracial individuals and they self-identify as individuals with two or more races (Choi, Herenkohl, Catalano, & Toumbourou, 2012). John (2012) asserts that higher education institutions should be more adequately prepared to "recruit, retain and graduate" (p. 6) multiracial individuals. The purpose of this study is to understand graduate multiracial students' lived experiences and to give voice to this increasing population's needs in higher education, especially at the graduate student level. **FRAMEWORK AND METHOD:** The framework used for this study is critical race theory (Delgado & Stefancic, 2001), and the methodology will include narrative inquiry (Savin-Baden & Van Niekerk, 2007) with a narrative case study analysis (Reissman, 2008). The study will identify three to five individuals, and they will be sent the screening tool, the demographic questionnaire and then the consent form. The doctoral research involves journal reflections and interview collection of data pertaining to the lived experiences of multiracial graduate students on a land grant and a predominately White institution. **FINDINGS:** The researcher will compare the data from previous multiracial research to understand the relationships for multiracial graduate students within this study (Herman, 2009; Chapman-Huls, 2009). **CONCLUSION**: This study will inform faculty with regard to relationship building and retention of multiracial students in graduate and professional schools.

THE ROLE OF FRAMES AND TALK IN PUBLIC DELIBERATION: A ROADMAP OF DELIBERATIVE DIALOGUE

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BACKGROUND AND PURPOSE: In recent years, the electorate has sought more localized control over the decision making process of communal economic, political, and societal concerns. Public deliberation offers a venue to create a sustainable dialogue for this localization of collaborative solutions to flourish. However, what has become increasingly unclear is how a small group of community stakeholders are able to create a growing dialogue compared to mere conversational stagnation when developing solutions. This study aims to understand the relationship between how a deliberation participant's type of utterance frame elicits specific types of responses in dialogue construction. **METHOD:** A content analysis was conducted involving 595 utterances from three public deliberations in rural Kansas communities. The analysis was filtered through what is termed as a micro-analytical framework to discern how inside influences affect the overall dialogue construction (Black et. al., 2011). **RESULTS/FINDINGS:** A significant value was associated between how deliberation participants frame utterrances and what type of utterances participants employ. Generally, interrogative frames elicit more clarification-seeking language regarding the process of deliberation, while declarative frames elicit more clear and confident claims of policy or fact. **CONCLUSION:** Facilitators who maintain and guide deliberation practices have the ability to identify patterns of talk during dialogue construction. Considering that interrogative frames elicit language seeking clarification utterances, it is likely that such occurrences are what diminish dialogue growth. Instead of being able to provide in depth construction of factual or policy utterances, participants diminish growth by clarifying concerns or questions when interrogative frames arise.

CUSTODY ARRANGEMENT DECISIONS IN DIVORCED OR SEPARATED FAMILIES

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BACKGROUND AND PURPOSE: Current research discusses the characteristics of parents in regards to their custody arrangements such as education, income, age of parents, and other characteristics, however, there is limited research on the decision making process of divorced and separated parents and their custody arrangement. Gaining insight into the decision making process of how divorced or separated parents determine the custody arrangements of their children would be beneficial. This study investigated how divorced or separated parents determine the custody arrangements for their children. **METHOD:** A secondary qualitative data analysis of a database of interviews from a previous grounded theory study of 30 participants was conducted. **RESULTS/FINDINGS:** Four categories emerged from the data including no court involvement, agreement decided by couple to be included in divorce decree, court ordered arrangement, and custody changed over time. In each of these themes, there were a variety of reasons both positive (e.g. fit the needs of the child) and negative (e.g. abuse or conflict) that influenced the custody arrangement determined among divorced or separated parents. **CONCLUSION:** There is not a universal arrangement that will be suitable for all divorcing or separating parents. By gaining an understanding of how divorcing or separating parents decide on the custody arrangement for their children, Family Life Educators have the opportunity to assist these parents working through the process of making child custody decisions through parent education courses and/or in a one-on-one setting. Lawyers and mediators will be better able to assist with the determination of custody arrangements and develop parenting plans.

EXAMINING THE ROLE OF VARIOUS FAULT ATTRIBUTIONS IN CHILDREN'S ANTICIPATED RESPONSE TO HYPOTHETICAL PEERS WITH UNDESIRABLE CHARACTERISTICS

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BACKGROUND AND PURPOSE: Children tend to stigmatize peers who are perceived as deviant or deficient in their appearance, ability, or behavior (e.g., Juvonen, 1991). However, relatively little is known about the extent to which children hold a peer personally responsible for the onset and the perpetuation of his/her undesirable characteristic. **METHOD:** Two studies examined the role of various fault attributions in children's anticipated responses to hypothetical peers described as having an undesirable characteristic. **RESULTS:** The children were found to distinguish among various fault attributions (i.e., general, onset, perpetuation; Study 1) and they tended to agree more strongly that the peers were responsible for the perpetuation than the onset of these characteristics (Studies 1 and 2). The more strongly the children agreed that (a) an aggressive peer is generally at fault for his/her undesirable characteristic (Study 1) and (b) peers who are aggressive, overweight, shy, or a poor student are at fault for the onset of their undesirable characteristics (Study 2), the less favorably they anticipated responding to these peers. Unexpectedly, attributing responsibility to forces "outside the peer's control" (i.e., parents, biology) for his/her undesirable characteristic in Study 2 was *not* found to be associated with a relatively favorable response to any peer with an undesirable characteristic. **CONCLUSION:** Encouraging children to understand that a peer is not personally responsible for (the onset of) his/her undesirable characteristic may yield a more favorable response to that peer than encouraging them to understand the specific factors outside the peer's personal control that may cause the characteristic to emerge or persist.

'DOCTOR, IT HURTS SO MUCH I CAN'T SIT DOWN':
MEDIA AND THE HEALTH COVERAGE OF BUTTOCK SILICONE INJECTIONS

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BACKGROUND AND PURPOSE: Research shows a variety of medical complications such as lymphedema, disfigured nodules and serious multi-organ failure as a result of injecting silicone in the subcutaneous layer of the buttock. With increase in the illegal procedures being performed by non-professionals, affected parties have been hesitant to reveal the source of their injections thus making diagnosis a huge hurdle for medical practitioners. This study aims at finding out the role media has played in reporting on the health complications of these silicon injections. The social learning and framing theory will be used to identify learned systems of this addiction and evaluate role of media has played in it. **METHOD:** An analysis of social media is being conducted to identify the patterns that will be referred to as frames. Areas of interest include how commenters respond to the initial media coverage and the interaction of subsequent commenters. **RESULTS:** So far, the study has explored 25 cases as part of a pre-test to identify possible frames to be used in subsequent analysis. Initial reports include tantamount evidence of women, especially in the United States, injecting themselves with silicone ordered via the Internet or easily obtained from a local hardware store. **CONCLUSION:** This research anticipates finding a window of solutions to the problem.

DID ASYMMETRIC MONETARY PREFERENCES FOR THE OUTPUT GAP DISAPPEAR DURING RECENT ECONOMIC TIMES?

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BACKGROUND AND PURPOSE: Beginning with Barro and Gordon (1983), there has been considerable recent work which has investigated monetary policy as being carried out within the context of an optimal planning structure. A recent variation of these models that has attracted considerable attention are structures in which the planner has asymmetric preferences over one or more economic targets. That is, central bankers take stronger actions during economic downturns than during economic upturns. Such models have been described and empirically investigated by Ruge-Murcia (2003, 2004), Nobay and Peel (2003), Surico (2007) and Cassou, Scott and Vázquez (2012) among others. The empirical results have been mostly favorable to the asymmetric preference structure, however, in Surico (2007), results were somewhat mixed. In particular, he did not find evidence in the more recent economic period of asymmetric preferences for the output gap, despite finding evidence in favor of it during an earlier period. This paper investigates the disappearance of asymmetric monetary preferences for the output gap during the post Volcker period beginning in 1982:4 which was shown by Surico (2007). **METHOD:** We investigate this issue using the model introduced by Surico(2007), but we incrementally started the sample period one quarter later. **RESULTS and CONCLUSION:** We show that the results for the recent data are sensitive to the initial date at which the empirical investigation is carried out. Using data that begins just a few quarters later, we show that the evidence for asymmetric preferences over the output gap becomes strong.

IS SUGARCANE A NEW DRIVER OF LAND USE AND LAND COVER CHANGE IN THE BRAZILIAN SAVANNA?

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BACKGROUND AND PURPOSE: Brazil has a long history of sugarcane cultivation where the traditional production areas were confined to the coast-line of the Northeast and to the Southeast states. However, a new frontier for sugarcane production has started to be developed in the last decade. This expansion of production has allowed this new frontier to become responsible for 22% of the national sugarcane ethanol production in 2013, with a planted sugarcane area of 1.2 million hectares, or 13% of the national planted area. For this expansion to take place, sugarcane is competing for land with pasture, food crops and large-scale crop farming, such as soybeans and corn, in the Center-West of Brazil, thus increasing the pressure over the Savanna Biome. This presentation will discuss the drivers of sugarcane expansion in the States of Mato Grosso do Sul and Goiás. **METHOD:** In this study we did a literature review to identify possible drivers. Also, we used secondary data, such as sugarcane production, area and yield, ethanol production, number and profile of mills, and remote sensing data, to analyze this expansion. **RESULTS AND CONCLUSION:** Our preliminary findings indicate that the expansion is a result of the interaction of political, environmental and economical drivers. The consolidation of ethanol industry in São Paulo and the difference in land price among São Paulo and the Center-West can be highlighted as majors drivers.

SOCIO-ECONOMIC VARIABILITY AND POPULATION CHANGE IN THE CENTRAL GREAT PLAINS

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BACKGROUND AND PURPOSE: Despite the common perception that the US Great Plains is a homogenous region plagued by population loss and economic distress, considerable diversity exists. Understanding such diversity is important to coping with various challenges facing the region. This study explores the relationship between socioeconomic diversity on the one hand and population change and social viability and sustainability on the other in the Great Plains counties of Kansas and Nebraska. **METHOD:** Empirical analysis uses data from the USDA's Economic Research Service (County Typology Codes, Rural-Urban Continuum Codes), and the US Census Bureau (County Buisiness Patterns). County Business Patterns are summarized and used to calculate the economic diversity index. The Geographic Information Systems (GIS) technology is used to analyze and display the results. **RESULTS/FINDINGS:** Despite varying characteristics, the region is defined by population loss and economic dependency. More than three in four counties display some type of policy issue or economic dependency, and less than 10% of the population resides in an urban setting. Where present, higher levels of diversity correspond with population growth and low dependencies. **CONCLUSION:** Although this region is not homogeneous, it is not healthy. Lacking advantages held by other rural areas, the Great Plains counties of Kansas and Nebraska display pressing community sustainability challenges.

HOW CAN WE UNDERSTAND MOLECULAR INTERACTIONS USING COMPUTERS?

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BACKGROUND AND PURPOSE: Computer simulations provide an inexpensive and informative technique for the study of molecules and molecular interactions in solution. However, computer simulations of molecules are only as accurate as the description of the atomic interactions. Here, we describe our ongoing efforts to improve the parameters used for common simulations of small molecules with the overall goal of providing an accurate description of lipids and membrane systems. The approach is outlined and illustrated for solutions of esters in water and alcohol solvents. **METHOD:** Parameters were optimized in order to reproduce experimental data provided by a rigorous theory of solution mixtures. This differs from the usual approaches taken in the field and provides an atomic level description of the properties of solution mixtures. **RESULTS AND CONCLUSIONS:** Optimized models for small molecule interactions can be developed that accurately reproduce a variety of properties of solution mixtures. This, in turn, provides confidence in the results for additional properties not amenable to experiment. The models developed here can be considered an essential first step in the development of accurate models for lipids which represent the dominant components of biological membranes.

EVALUATION OF THE CHARACTERISTICS OF RED LIGHT RUNNING CRASHES AND COMPARISON WITH OTHER INTERSECTION CRASHES

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BACKGROUND AND PURPOSE: Red light running has become a serious safety issue at signalized intersections throughout the United States. There have not been many studies to identify the factors related to red light running crashes. This study has been carried out to identify the characteristics of red light running crashes and the drivers involved in them. Driver characteristics, time and day of the crash, occupancy and environmental factors were tested against any relationship with the red light running crashes and other crashes. **METHOD:** As a case study, crashes happened in the State of Kansas were analyzed. Contingency table analysis has been used to identify whether a particular factor is related to the crash type or not. Control crash type considered here against the red light running crashes was other signalized intersection crashes. **RESULTS/FINDINGS:** According to the results of the statistical analysis, some driver aspects such as age and the safety equipment usage were related to the crash type whereas the gender of the driver was not. Both the injury severity of the driver and the reporting severity of the crash showed relationships with the crash type. Time and the day of the crash were also found to be related. From the environmental factors considered, the light condition was not related while the adverse weather condition showed a relationship. The surface condition is related to the crash type whereas presence of passengers was not. **CONCLUSION:** Results of this study can be used to identify the factors affecting red light running crashes and thus can be used to develop countermeasures accordingly.

A SOFTWARE TO CAPTURE THE REAL PERFORMANCE OF RC COLUMNS

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BACKGROUND AND PURPOSE: There are many reinforced concrete columns which are designed based on old seismic codes but their flexure, shear and energy dissipation capacities are not enough based on new codes. It is more feasible to retrofit these columns, mostly by FRP, than to replace them entirely. Assessment of the real performance of a column is necessary for any decision to retrofit or replace a deficient column. This performance is affected not only by the material properties and confining effects of conventional as well as FRP reinforcement, but also the loading history and pattern. The few available analytical tools such as ANSYS, ABAQUS or OpenSees, have a very steep learning curve and are not the first choice for a design engineer who wants to assess the real performance of a column. To address this need a windows-based software is developed, for analysis of reinforced concrete columns with any geometry, confinement and load pattern. **METHOD:** The program implements fiber model and monotonic and cyclic material models for plain and confined concrete, FRP material and various assumptions on the curvature distribution along columns. **RESULTS/FINDINGS:** The program performance was validated against experimental data, using proper material monotonic models and cyclic rules, and implementing plastic hinge model, including the models and assumptions developed by the authors. **CONCLUSION:** The developed software is a user-friendly analytical tool that can be used by engineers to assess the performance of reinforced concrete columns and by researchers for evaluation of various analytical models.

2 CALABI-YAU CATEGORIES AND QUIVERS

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BACKGROUND AND PURPOSE: Mirror symmetry is an area based on interaction between string theory and geometry. The invariants of Calabi-Yau cagegories is a very important topic in this area. Literatures have shown that there is a one-to-one correspondence between equivalence classes of 3 Calabi-Yau categories with some specific generators and isomorphic classes of quivers with potential, and there are many results about Donaldson–Thomas invariants of 3 Calabi-Yau categories. Similar research could be applied to 2 Calabi-Yau categories. **METHOD:** Deformation theory will be used to get a relationship between 2 Calabi-Yau categories and quivers. We will also use the relationship between 3 Calabi-Yau categories and 2 Calabi-Yau categories. **RESULTS AND CONCLUSION:** There is a one-to-one correspondence between equivalence classes of 2 Calabi-Yau categories with some specific generators and isomorphic classes of symmetric quivers with even number of loops. We will also get some properties of invariants of 2 Calabi-Yau categories.

A CLASS OF GEOMETRIC REPRESENTATIONS OF COHOMOLOGICAL HALL ALGEBRA

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BACKGROUND AND PURPOSE: Algebra is a mathematical object who encodes a lot of information coming from mathematical models. Representation theory is a way to extract these information from the algebra. One algebra can have a lot of different representations, and each representation gives part of the information of the algebra. In the study of Donaldson-Thomas invariants of a given category and algebras of BPS states, M. Kontsevich and Y. Soibelman introduced a remarkable algebra called Cohomological Hall algebra (COHA). My work is to use a class of geometric representations to study the structure of a special type of COHA (type A_1). **METHOD:** Moduli space is a key concept in the theory of COHA. The definition of COHA is based on moduli spaces combined with the standard pullback-pushforward strategy. To construct the geometric representations, we first restrict the general moduli spaces we use to a special type of moduli spaces called framed moduli spaces. Then we apply the standard pullback-pushforward strategy to the framed moduli space and get a class of representations of COHA over the cohomology of flag varieties. It is called 'geometric' because flag varieties are geometric objects well-known in mathematics. The construction simplifies the computation significantly since framed moduli spaces have better properties than general moduli spaces, and this enable us to compute all the details of these representations. **RESULTS/CONCLUSION:** We compare the representations with known results. These representations indicate that type A_1 COHA is related to infinite Clifford algebra, which is extensively studied in the past.

DEMONSTRATING A MID-INFRARED OPTICALLY PUMPED GAS-FILLED HOLLOW-CORE FIBER LASER

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BACKGROUND AND PURPOSE: The first optically pumped gas laser based on population inversion in a hollow core photonic crystal fiber with near-ideal efficiency has been demonstrated in our lab. This novel laser has potential applications on atmospheric transmission and free-space communications. **METHOD:** Mathematical modeling of the laser has been developed and used to allow accurate analysis of the absorbed pump pulse energy. Work is ongoing to demonstrate the first continuous wave version of the laser. **RESULTS/FINDINGS:** Calculations have shown that the CW version of the laser would be possible using small core diameter (~ 10 μm), low loss (~ 0.02 dB/m) gas-filled HC-PCFs. Furthermore, the fiber will likely need to be placed within an external resonator having moderate finesse (round trip loss $\sim 10\%$ or less) at the laser wavelength to reduce the pump powers required to reach the laser threshold to the order of several watts. Energy states and transitions of $H^{13}CN$ let us pump at 1536.7 nm and get lasing at longer wavelength of 1547.4 nm. Current challenges are finding external resonator mirrors, choosing the right fiber which also has a good transmission at the pumping and lasing wavelengths, and being equipped with a source to provide sufficient pumping. **CONCLUSION:** Demonstrating the CW version of the laser will be an advancement towards producing a single coherent output from many mutually incoherent pump sources. Such a laser has the potential to be used for applications requiring high powers and good beam quality.

MID-IR OPTICAL FIBER TRANSMISSION FOR GAS FILLED PHOTONIC CRYSTAL LASERS

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BACKGROUND: The purpose of this research is to measure the transmission loss through hollow core fibers from a mid-infrared (mid-IR) blackbody source through hollow core photonic crystal fiber toward the optimization of the fibers and subsequently, gas-filled hollow fiber lasers. mid-IR transmission is important for both furthering research and industrial capabilities in areas such as communication, spectroscopy and remote gas sensing. Fibers commonly used in near-IR applications, such as telecommunications, are typically made of solid fused silica. These fibers are robust and durable, but the glass absorbs light in the mid-IR wavelength range. Other materials that transmit mid-IR light are difficult to fashion into optical fiber. Hollow-core fused silica fibers are excellently suited for mid-IR transition because light is guided in the hollow region. **METHOD:** To characterize the fibers, light from a commercial black body source is coupled into many various hollow-core fibers fabricated by Fetah Benabid's research group at XLIM and the University of Limoges, France. A monochromator is used in conjunction with a photo detector to selectively observe the transmission of a small range of wavelengths in the mid-IR range. The fiber is then cut and the spectrum is measured again. This cut-back measurement characterizes the spectral dependent loss of the fiber per meter in the mid-IR range. **CONCLUSION:** The lowest loss fibers will be used for gas-filled hollow fiber laser studies, and the results will be used to improve the design of hollow optical fiber.

FREE- SPACE NPR MODE-LOCKED ERBIUM DOPED FIBER LASER BASED FREQUENCY COMB TOWARDS APPLICATION TO OPTICAL FREQUENCY MEASUREMENT

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BACKGROUND AND PURPOSE: Optical frequency combs produced by mode-locked femtosecond fiber lasers are vital tools for high precision frequency metrology and molecular spectroscopy in a robust and portable format. We have specifically investigated erbium-doped fiber (EDF) mode-locked ultrafast lasers via nonlinear polarization rotation (NPR) in the normal dispersion regime. This report demonstrated a passively mode-locked fiber laser based on NPR with a repetition rate of 89 MHz producing an octave-spanning spectrum due to supercontinuum generation (SG) in highly nonlinear fiber (HNLF). Our goal is to phase stabilize this frequency comb. **METHOD:** The amplified transform limited pulse, with an average power of 180 mW and pulse duration of 70 fs, is used to generate a supercontinuum of 140 mW. The pulse output from the NPR comb is amplified through a 1 m long EDF, then compressed by a length of anomalous dispersion fiber to a near transform limited pulse duration. SG via propagation in HNLF is optimized for specific polling period and heating temperature of PPLN crystal for SHG at 1025 nm. The RF beat signal, which is produced by mixing the fundamental and SHG, will be used to phase stabilize the comb. **RESULTS/FINDINGS:** By using the free-space NPR comb scheme, we have not only shortened the cavity length, but also have obtained 5 to 10 times higher output power (more than 30 mW) compared to conventional all-fiber cavity structure. More importantly, we have achieved highly stable self-starting NPR mode-locked femtosecond fiber laser based frequency comb.

PORTABLE ACETYLENE FREQUENCY REFERENCES IN GAS-FILLED PHOTONIC MICROCELLS

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BACKGROUND AND PURPOSE: There are many applications for stable optical frequency references, for example, the telecommunication industry, navigation, and remote sensing. For stable references in the Near IR, lasers can be locked to narrow absorption features in gases such as acetylene. **METHOD:** A low-loss hollow core optical fiber with a diameter of sub millimeters is integrated into our setup to provide long interaction lengths between the filling gas and the laser field and facilitate the optical interaction with low power levels. **RESULTS/FINDINGS:** Previously our group has demonstrated tens of kHz level frequency references inside gas-filled optical fibers. To make these references more portable, the gas can be sealed inside the hollow-core fiber, by creating a photonic microcell. **CONCLUSION:** Here, we report on our recent improvements to fiber splicing techniques, including angle splicing techniques, and examine the quality of the frequency reference thereby created. We have realized a half-cell with factor of 4 improvements in accuracy over the commercial acetylene references of comparable cost, and with an accuracy comparable to acetylene references of much higher cost (over $100k). The technique should be readily extended to a full cell with some technical development.

PROPER PROTEASOME ASSEMBLY: THE PLAY OF AFFINITY SWITCH BY PROTEASOME CORE PARTICLE

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BACKGROUND AND PURPOSE: A large protease complex called the proteasome plays major role in maintaining protein balance inside the cell through degradation of unwanted proteins. This 2.5MDa large complex consist of two sub-complexes; core particle (CP) which harbors proteolytic active sites and regulatory particle (RP) which regulates the substrate entry into the proteasome. Several CP and RP dedicated chaperone proteins have been shown to assist in assembly of these subcomplexes. We hypothesize that these chaperones also prevents the formation of nonfunctional proteasomes by avoiding early RP-CP interactions when these subcomplexes are in an immature state. **METHOD:** Through biochemical purifications we were able to demonstrate that the CP chaperone Pba1 prevents the formation of immature and nonfunctional proteasome complexes as it competes with RP for CP binding. Kinetic analyses of the Pba1-CP interactions show that Pba1 has strong affinity for immature CP and weak affinity for mature CP complexes. **RESULTS/FINDINGS:** We showed that the strong affinity to immature CP is important to prevent RP from binding to immature CP. The switch in affinity is important to release Pba1 upon CP maturation. **CONCLUSION:** Understanding the role of chaperones in crucial steps of proteasome assembly will help in identifying new drug targets with the goal to manipulate the formation of functional proteasome complexes. The development of alternative approaches to down regulate proteasome activity are important, because of increasing resistance to proteasome inhibitor based drugs used in the treatment of multiple myeloma and mantle cell carcinomas.

HOST SPECIES-SPECIFIC INHIBITION OF PROTEIN KINASE R BY LEPORIPOXVIRUSES

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BACKGROUND AND PURPOSE: PKR is an important antiviral kinase in vertebrates, which evolves rapidly, likely due to the positive selective pressure exerted by viral antagonists. Positively selected sites in the PKR kinase domain influence PKR sensitivity to vaccinia virus K3L. Since the natural host for vaccinia virus is unknown, we studied the PKR-pseudosubstrate inhibitor interactions between myxoma virus and rabbits, a well-defined host-virus system, using the myxoma virus K3L ortholog M156R and PKRs from their rabbit hosts. **METHOD:** The sensitivity of PKR to poxvirus inhibitors was analyzed in yeast-growth and luciferase reporter assays. K3L/E3L double-deleted vaccinia virus was used to infect European rabbit RK13 cell lines that stably express K3L and M156R. **RESULTS AND CONCLUSION:** Our results indicate that M156R had no effect on human, mouse and hamster PKR but effectively inhibited rabbit PKR. PKR from the brush rabbit, which is the natural host for myxoma virus, was inhibited more effectively than European rabbit PKR. We also demonstrate that the helix αG region of rabbit PKRs is responsible for their differential sensitivity to inhibitors. In conclusion, PKR pseudosubstrate inhibitors evolved to inhibit the PKRs of their natural hosts with highest specificity and that insensitivity of PKR to inhibition might serve as an effective barrier to prevent virus transmission to more distantly related species. In addition, a point mutation in M156R found in 8 out of 22 myxoma virus isolates collected in the field from Australia, was shown to be a loss-of-function mutation, which suggests a molecular mechanism whereby myxoma virus may have become attenuated during host-virus co-evolution.

DEFECIENCY OF THE LYSOSOMAL STORAGE DISORDER-RELATED PROTEIN CLN5 INDUCES ALTERATIONS IN AUTOPHAGY

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BACKGROUND AND PURPOSE: CLN5 is one of several proteins attributed to lysosomal storage disorders when mutated, specifically Neuronal Ceroid Lipofuscinosis (NCL). A soluble lysosomal protein, CLN5 has no known function at this time. The cellular mechanisms by which NCL is caused are currently unknown as well. Previously we showed that eight asparagine residues in CLN5 are N-glycosylated, and that this modification is important for the protein's transport and function. Now, we have identified a link between the activation of autophagy and CLN5 deficiency. The autophagy-lysosomal protein degradation system is one the major pathways the cell uses to degrade intracellular material and recycle cellular building blocks. **METHOD/RESULTS/FINDINGS:** By knocking down endogenous CLN5 we showed that, upon stress induction, cells responded with higher levels of autophagy activation. Consistent with these knock-down experiments, there is a higher level of the autophagy marker protein, LC3-II, in CLN5 patient cells. Additionally, reintroducing CLN5 to deficient patient cells shows a rescue effect through their decrease in the autophagy hallmark LC3-II. **CONCLUSION:** In summary, we discovered that the autophagy pathway is altered in CLN5 deficient cells, indicating a role for CLN5 in autophagy. Further analyses of the autophagy pathway will shed light on where CLN5 is acting and the mechanism by which defective CLN5 causes NCL.

MOLECULAR MECHANISMS OF HOST RANGE GENES IN VACCINIA VIRUS

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BACKGROUND: Vaccinia virus is a poxvirus whose infection of a broad range of hosts is controlled by several host range genes. These genes interact with host proteins involved in detecting and initiating an antiviral response in infected cells. Protein kinase R (PKR) is an antiviral protein that suppresses general translation during a virus infection. Two host range genes from vaccinia virus, E3L and K3L, inhibit this function of PKR. E3L was previously shown to be dispensable for vaccinia virus infection of Syrian hamster cells but essential for infection of cells of other origin, however the molecular basis for this was unknown. **METHOD:** We utilize a luciferase reporter transfection system to measure interactions between E3L and K3L and PKRs from different species in a line of HeLa cells deficient in endogenous PKR. Infections of different species' cells with Vaccinia viruses lacking E3L and/or K3L provided comparative evidence for the importance of each gene to viral replication in different hosts. **RESULTS:** We show that Syrian hamster PKR is resistant to inhibition by E3L while being sensitive to inhibition by K3L, and this differential sensitivity can restrict replication of the mutant viruses in Syrian hamster cells. In contrast, PKR from other hamster species displayed different sensitivities to these viral inhibitors. Furthermore, we identified regions in PKR important for the differential sensitivity through comparative analyses of chimeric hamster PKRs. **CONCLUSION:** Species-specific differenecs in the sensitivity of PKR to vaccinia virus inhibitors are the molecular basis for the host range function of E3L and K3L.

MULTIPLE NUCLEAR LOCALIZATION SIGNALS MEDIATE NUCLEAR LOCALIZATION OF THE GATA TRANSCRIPTION FACTOR AREA

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BACKGROUND AND PURPOSE: Transcription factors are synthesized in the cytoplasm but act in the nucleus to regulate gene expression. The GATA transcription factor AreA from the fungus *Aspergillus nidulans* activates transcription of nitrogen metabolic genes. AreA accumulates in the nucleus during nitrogen starvation but not in the presence of nitrogen nutrients. We aim to understand how AreA is directed to the nucleus. **METHOD:** Sequence analysis revealed five classical nuclear localization signals (NLSs) and one non-cononical bipartite NLS. We have fused these NLSs separately and in combination to green fluorescent protein (GFP) and expressed them in *A. nidulans* to determine if they are sufficient for nuclear localization. **RESULTS:** The bipartite NLS strongly directed GFP to the nucleus, whereas the classical NLSs directed GFP to the nucleus via collaboration. **CONCLUSION:** Therefore, AreA contains multiple NLSs which work together to mediate nuclear import.

A NOVEL LUMINOL LUMINISCENCE BASED THERANOSTICS FOR BREAST ADENOCARCINOMA

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BACKGROUND AND PURPOSE: Breast cancer ranks second as a cause of cancer death in women in USA. Detection of early tumors and tumor targeted treatments could decrease the problems associated with breast cancer management. Photodynamic therapy (PDT) is a cancer treatment that uses a photosensitizer (PS) and a specific wavelength of light, currently in clinical trials for breast cancer. Poor tissue penetration of light is a major limitation in PDT and light generation at the tumor area might increase its effectiveness. Polymorphonuclear neutrophils(PMNs) are known to often infiltrate breast adenocarcinoma and their activatation in tumor stroma produces luminiscence in the presence of luminol. Here, we hypothesized that luminol can be used as a theranostic agent for luminiscence based early tumor detection(diagnosis) and PDT(treatment). **METHOD:** BALB/c mice were transplanted with 4T1 mammary adenocarcinoma cells to establish a breast adenocarcinoma model. Early tumor detection objective was tested by daily intraperitoneal injection of luminol and *in vivo* luminescence imaging. To test PDT, PS 5-aminolevulinic acid (ALA) and luminol were administered to mice through intraperitoneal and intravenous routes, respectively. This treatment regimen was repeated six times and ALA alone/luminol alone/saline treated tumor-bearing mice were used as controls. **RESULTS/FINDINGS:** Luminol allowed detection of activated PMNs only two days after 4T1 cell transplantation, even though tumors were not yet palpable. Analysis of the data showed that treatment with a combination of luminol and ALA as well as treatment with luminol alone results in attenuation of tumor growth. **CONCLUSION:** This study gives evidence for theranostic ability of luminol on breast adenocarcinoma.

IDENTIFICATION OF KEY RESIDUES INVOLVED IN IMMUNE ANTIGONIST FUNCTION OF PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS NSP1BETA PROTEIN

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BACKGROUND AND PURPOSE: Non-structural protein 1β (nsp1β) of Porcine Reproductive and Respiratory Syndrome virus is the main viral antagonist to type I IFN productionand signaling. This protein could also selectively suppress cellular gene expression. Double mutations K124A/R128A targeting a highly conserved motif of nsp1β, G**K**YLQ**R**RLQ (in bold), impaired the ability of nsp1β to suppress innate immune response and certain cellular gene expression. However, the recombinant virus carrying this double mutations showed cripple growth characteristics. In this study, to konck down the immune antagonist function of nsp1β and optimize the growth of the mutant virus, a panel of single and double mutations targeting on the motif of nsp1β, GKYLQRRLQ, was tested. **METHOD:** Site-directed mutagenesis was performed to create mutations in nsp1β. The reporter systems for IFN-β stimulation and signaling were used to evaluate the ability of nsp1β mutants to suppress innate immune response. Finally, recombinant viruses were recovered using reverse genetics and characterized in *in vitro*. **RESULTS/FINDINGS:** Single mutations (R128A or R128K) at residue R128 impaired the ability of nsp1β to suppress IFN-β stimulation and signaling, and suppress nsp1β 'self-expression' *in vitro*. The viable recombinant virus carrying the mutation R128A or R128K, was generated using reverse genetics. **CONCLUSION:** Our data suggest that the amino acid R128 is critical to the innate immune antagonist function of nsp1β. Modifying key residues at the highly conserved GKYLQRRLQ motif could attenuate virus growth and improve the cellular innate immune responses. Future studies are needed to test the ability of nsp1β mutants in the induction of protective immune responses in animals.

FAVORABLE ALLELE ON CHROMOSOME 4 IS ASSOCIATED WITH RESILIENCE TO PORCINE CIRCOVIRUS ASSOCIATED DISEASE

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BACKGROUND: Porcine Circovirus Associated Disease (PCVAD) describes several disease syndromes associated with porcine circovirus type 2 (PCV2). The level of PCV2 viremia is increased in the presence of porcine reproductive and respiratory syndrome virus (PRRSV). These co-infections can result in high morbidity and mortality in swine production and cause a significant economic impact. **METHODS:** To evaluate the host response of different genotypes to co-infection, approximately 230 8-week old pigs were challenged with PCV2 and PRRSV and followed for 42-days. Half of these pigs had a favorable B allele (AB) on chromosome 4 which was previously associated with increased weight gain and decreased viral load; the remaining pigs were AA. Between day 22 and day 35 post-challenge, a significant increase in mortality and morbidity occurred. Clinical signs appeared consistent with PCVAD. Lung lesions were evaluated in 18 pigs with and without clinical signs. Four groups of pigs (AA clinical, AA nonclinical, AB clinical, AB nonclinical) were evaluated. Pigs were assigned a designation of severity for gross lung lesions, microscopic lung lesions, and lymphoid depletion. Viremia levels for PCV2 and PRRSV at the time of necropsy were quantified for each animal using real-time PCR. **RESULTS/CONCLUSION**: Pigs with the favorable AB genotype showed increased average daily weight gain when compared to the AA genotype despite the presence of gross and microscopic lung lesions, PCV2 related lymphoid depletion, and clinical signs. These results suggest that the presence of the favorable allele on chromosome 4 is associated with continued weight gain in the presence of clinical disease.

Poster Abstracts

Undergraduate Research

1
INVESTIGATIN THE EFFECTS OF ELEVATED TEMPERATURE ON *TOMATO SPOTTED WILT VIRUS* ACCUMULATION AND EXPRESSION OF PUTATIVE HEAT-SHOCK PROTEIN GENES IN THE INSECT VECTOR, *FRANKLINIELLA OCCIDENTALIS*

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Scientists estimate that global climate change will expand the geographical limits of arthropod vector-borne pathogens. One sign of climate change is elevated temperatures in terrestrial ecosystems. We study the virus-vector relationship of *Tomato spotted wilt virus* (TSWV), a plant-pathogenic bunyavirus, and *Frankliniella occidentalis*, the western flower thrips (WFT) vector that transmits the virus to a variety of plants. **BACKGROUND:** Others demonstrated that TSWV-infected WFT develop faster and transmit the virus more efficiently at elevated temperatures. Heat-shock proteins (HSPs) have been shown to interact with viral proteins to affect replication of plant and animal viruses. In addition, HSPs are responsive to thermal stress, and one report documented enhanced expression of HSP 90/70 organizing protein in WFT exposed to high temperatures. **PURPOSE**: We hypothesize that the enhanced efficiency of transmission at higher temperatures is explained, in part, by increased accumulation of TSWV in the vector, which may be associated with enhanced expression of HSPs. **METHOD**: To investigate the effects of temperature on virus accumulation and expression of HSPs in WFT, we designed an experiment to quantify the effect of temperature (19°C, 24°C, and 29°C) on TSWV titer during vector development and transmission efficiency as adults; and to determine the relationship(s) between TSWV titer and transcript abundance of six major putative HSPs at the three different temperatures. **RESULTS**: We report on the effect of temperature on virus accumulation and transmission, and the identification of putative HSP sequences from our WFT transcriptome database that will serve as candidates for gene expression analyses using quantitative real-time reverse-transcriptase PCR.

3
STRUCTURE DETERMINATION OF THE YEAST PROTEASOME CHAPERONE NAS2

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BACKGROUND AND PURPOSE: The degradation of proteins by the proteasome is important in many cellular processes as well as for the removal of damaged proteins. The proteasome is a large complex consisting of 66 subunits that have to assemble into one large molecular machine. To achieve this, the assembly is assisted by nine proteasome-specific chaperones. One of the chaperones is called Nas2 and it binds to the proteasome subunit Rpt5. Our goal is to map the region of Nas2 that interacts with Rpt5 and determine the three-dimensional structure of this region. **METHODS:** Analysis of the Nas2 amino acid sequence, shows a predicted PDZ domain within the protein. We produced several truncations of Nas2 that contain the PDZ domain and determined the affinity of these domains with Rpt5 using the BLItz instrument. From two well expressing and Rpt5 binding fragments we produced large amounts that we submitted for crystallization screens. **RESULTS/FINDINGS:** Our results show that the binding between Nas2 and Rpt5 is mediated by the PDZ domain. One of the fragments produced crystals from which we were able to determine the crystal structure of Nas2 PDZ domain at 1.15A resolution. **CONCLUSION:** Nas2 contains a PDZ domain that is responsible for the interaction with the proteasome subunit Rpt5. The next goal is to utilize this structure to understand how Nas2 binds to Rpt5 and make testable predictions of the mechanism of chaperone assisted assembly.

4
THE PROTEASOME CORE PARTICLE CHAPERONE PBA1 AND 2 PREVENT FORMATION OF NON-FUNCTIONAL PROTEASOME

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BACKGROUND AND PURPOSE: The proteasome is a complex protease responsible for the degradation of many proteins inside the cell. It plays an important role in neurodegenerative diseases and certain cancers. During formation of the proteasome, first a subcomplex known as the core particle (CP) has to form. Once formed, the CP binds with a second subcomplex known as the regulatory particle (RP) to form proteasomes. The dimer Pba1-Pba2 is a proteasome specific chaperone that interacts exclusively with immature CP. We hypothesized that one function of Pba1-Pba2 is to prevent RP from binding to CP before the subcomplex is fully formed. The goal of my project is to test this in yeast using biochemical purifications. **METHODS:** Mutant yeast strains were made that enabled us to purify immature CP using an affinity tag. In these strains we subsequently removed the gene coding for Pba1. Immature CP was purified from the strains and samples were analyzed by SDS-PAGE followed by coomassie blue staining or western blotting. **RESULTS/FINDINGS:** Our results indicated that in strains lacking PBA1, the CP precursor interacts with various subunits of the RP. **CONCLUSION:** The results show that the Pba1-Pba2 dimer acts as a roadblock preventing RP subunits from binding to the CP before it is fully formed. If we can learn specifically how the proteasome assembles, we can better identify natural variants of this to allow for a more specific treatment of faulty proteasomes.

5
CHARACTERIZING THE INSECT VECTOR RESPONSE TO RHABDOVIRUS INFECTION

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BACKGROUND: Arthropod vectors play an essential role in dissemination of viruses that cause diseases. Studies have shown that arthropod vectors can sustain extensive virus infections; however, there are limited reports of viruses being pathogenic to their vectors. Our central hypothesis is that the vector innate immune system is activated by viruses resulting in transmission to hosts with little to no virulence to the vector. We are using the *Peregrinus maidis-Maize mosaic rhabdovirus* (MMV) system to study vector-virus interactions. **PURPOSE:** *P. maidis* transmits MMV to plant hosts. MMV replicates in the vector and persists throughout its life, although MMV is not pathogenic to *P. maidis*. Insects respond to viral infection by activating their innate immune system including the Janus kinase/signal transducers and activators of transcription (JAK-STAT) pathway. The JAK-STAT pathway is a major component of innate immunity to viruses. We hypothesized that the JAK-STAT pathway is involved in *P. maidis* response to MMV. **METHODS:** We constructed a database for JAK-STAT pathway genes using ImmunoDB, and identified *P. maidis* orthologs by comparison of sequences using tBLASTx. For the JAK-STAT pathway, we discovered expressed sequence tags (ESTs) with significant similarity to signaling genes and to response genes. We used real-time PCR to examine JAK and SOCS5 gene expression. **FINDINGS:** JAK expression in PBS-injected and MMV-injected insects was not significantly higher. However, SOCS5 expression in MMV-injected *P.maidis* was significantly higher than PBS-injected insects, suggesting that high virus titer upregulates expression of this gene and that this pathway is responsive to virus infection in *P.maidis*.

6
DEPTHWISE PETROPHYSICAL VARIATIONS OF THE ARBUCKLE AQUIFER: IMPLICATIONS FOR CO$_2$ STORAGE

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BACKGROUND AND PURPOSE: As a result of increasing concern over anthropogenic greenhouse gas emissions, the saline Arbuckle aquifer of south-central and western Kansas has recently become a subject for assessing regional CO$_2$ storage potential. Two well locations were chosen (Cutter KGS#1, SW KS; Wellington KGS 1-32/1-28, SC KS) to assess the depthwise petrophysical variations that exist throughout the vertical extent of the Arbuckle and its surrounding units. **METHOD:** Core was taken from 5236.55' to 7587.95' (Cutter) and 3681.9' to 5176.9' (Wellington) and thin sections were strategically chosen at intervals of interest between both of these depth ranges. The aim of this project was to characterize the dominant lithologies and pore distributions in an attempt to understand the mechanisms that will likely occur post-injection of supercritical CO$_2$. Petrographic analyses, both in hand sample and thin section, were executed to provide a comprehensive survey of the dominant mineralogies and pore types within each interval. **RESULTS/FINDINGS:** Three zones of interest were identified: the overlying Mississippian pay zone, the Jefferson City dolomite (upper Arbuckle, potential baffle), and the Gasconade dolomite (lower Arbuckle, injection zone). The predominantly carbonate mineralogy of both wells serves as a source of Ca^{2+}, Mg^{2+} and CO$_3^{2-}$ that can buffer the pH and increase CO$_2$ solubility, and combined with dissolved cations from accessory minerals (i.e. clays, sulfides, silicates), can potentially foster an environment suitable for mineralization trapping CO$_2$ mechanisms. **CONCLUSION:** Understanding the depthwise petrophysical variations is an essential component in maintaining environmental integrity and preventing any sort of undesired leakage from occurring.

7
IMPACT OF NITRATE SUPPLEMENTATION VIA BEETROOT JUICE ON CAPILLARY HEMODYNAMICS IN SKELETAL MUSCLE OF RATS IN CHRONIC HEART FAILURE

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Chronic heart failure (CHF) causes deficiencies in skeletal muscle blood flow resulting in compromised skeletal muscle capillary red blood cell (RBC) distribution and hemodynamics. These impairments may be due, in part, to reductions in nitric oxide (NO) bioavailability within skeletal muscle. In healthy animals, nitrate (NO$_3^-$) supplementation via beetroot juice (BR) elevates skeletal muscle blood flow and raises the pressure head for capillary-myocyte O$_2$ flux during exercise presumably following a stepwise reduction to NO *in vivo*. **PURPOSE:** We hypothesized that BR supplementation would increase the % of capillaries supporting RBC flow at rest and during contractions in CHF rats. **METHODS:** CHF was induced in young adult male Sprague-Dawley rats via myocardial infarction (MI). Following a 5-week recovery period rats were given BR ([NO$_3^-$] 1 mmol/kg/day, CHF+BR) or water (CHF) for 5 days. MI size was not different between groups (CHF: 28 ± 5, CHF+BR: 28 ± 6 %). Intravital microscopy was used to study the *in vivo* spinotrapezius muscle microcirculation at rest and during 180 s 1Hz twitch contractions (6-8 V). **RESULTS:** The percentage of capillaries supporting continuous RBC flow was elevated in CHF+BR rats at rest (CHF: 65 ± 6, CHF+BR: 76 ± 2 %, *P*≤0.05) and during contractions (CHF: 78 ± 6, CHF+BR 82: ± 2 %, *P*<0.05). **CONCLUSION:** The improvements seen herein are likely due to enhanced arteriolar vasodilation mediated, in part, by elevated NO bioavailability. These results suggest that NO$_3^-$ supplementation via BR may constitute a viable therapeutic modality that improves muscle vascular and potentially metabolic function in CHF.

8
ENHANCED POOL BOILING HEAT TRANSFER USING GRAPHENE-COATED SURFACES

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BACKGROUND AND PURPOSE: The purpose of this research is to evaluate the improved pool boiling heat transfer performance of surfaces coated with different wettabilities. Boiling is an efficient way to transfer large amounts of heat due to the latent heat of vaporization; making it ideal for industrial applications such as a power plants and electronics cooling. In pool boiling, heat is transferred from a solid surface to a stagnant liquid at surface temperatures that exceed the saturation temperature of the liquid. In this experimental study, a silicon surface is coated with graphene to test whether it can promote nucleation and enhance the heat transfer coefficient. **METHOD:** The silicon wafer is coated with graphene to test whether it can promote nucleation and enhance the heat transfer coefficient. The test surface is submerged and held at the bottom of the polycarbonate pool. Measurements are tak en visually with a high speed camera and with a DAQ that is connected to the thin-film heater on the underside of the surface. **RESULTS/FINDINGS:** We predict that the graphene surface will have an enhanced heat transfer coefficient compared a plain silicon wafer surface because of its hydrophobicity. Graphene has the ability to enhance heat transfer as a boiling surface, which could create more applications for grapheme. **CONCLUSIONS**: We will evaluate results to determine whether graphene surfaces enhance the heat transfer coefficient and critical heat flux more than previously studied surfaces such as biphilic surfaces. Preliminary results show that graphene-coated surfaces induce more bubbles at lower heat fluxes.

9
DEVELOPMENT OF IMAGE PROCESSING ALGORITHMS TO AUTOMATE SOYBEAN APHID (*Aphis glycines*) SCOUTING

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BACKGROUND AND PURPOSE: Implementing effective scouting methods is a crucial step in making crop management decisions. For soybean (*Aphis glycines*), current sampling methods rely on manual (human sensory) estimates of soybean aphid densities. Combining sophisticated algorithms with a mobile device to count aphid densities could improve these estimates. While this method could reduce scouting time, there are issues that can arise from developing an algorithm to count aphids from images. For example, variance in aphid size and color, leaf color, and camera distance could impact the success of an estimation algorithm. The goal of this research was to determine and minimize such effects. **METHOD:** In this study, image samples of varying aphid densities were collected via digital cameras. We designed the computer algorithm to incorporate built-in MATLAB image processing code to perform edge detection, thresholding, and object-based counting. We assessed the accuracy of the MATLAB code by comparing counts from processed images to manual counts. **RESULTS/FINDINGS:** We found a strong positive relationship between the aphid counts in the MATLAB processed images and manual counts ($R^2 = 0.75$). This relationship was then validated using an independent dataset ($R^2 = 0.93$). **CONCLUSION:** Our data indicates that the accuracy of the MATLAB code was similar to manual counts. This finding suggests that image processing is an effective method for counting aphids on soybean leaves. Further refinement of program utility will be accomplished through determination of error sources to improve accuracy and precision of estimated counts, while implementing the code with a handheld device for use in crop fields.

CONTROL SYSTEM DESIGN FOR A REDUCED GRAVITY SIMULATION HOIST

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BACKGROUND AND PURPOSE: The job of an astronaut is physically demanding and in order to ensure an astronaut's safety it is important to determine if an individual is fit enough for space. This is difficult to asses, but a group of Kansas State University researchers are working to identify physiological parameters that can predict astronaut space flight readiness. To identify these parameters it is valuable to determine the physical difficulty of certain movements in low gravity. Therefore, we have developed a hoist that is capable of offloading a desired percentage of an individual's weight allowing for kinesiological testing in simulated reduced gravity. The design of a control system for this hoist is the focus of this research. This system is somewhat unique because it cannot be controlled accurately using standard control structures such as PID. Therefore, the design is performed using frequency domain methods. The underdamped nature of the system provides an additional obstacle to overcome. **METHOD:** First, a dynamic model of the hoist is identified by performing open-loop frequency response tests. This model is then used to design a control system capable of responding quickly and accurately to changes in the force being measured by the system due to human subject movement in the vertical direction. **CONCLUSION:** This system has been tested with human subjects successfully and will soon be used to perform the kinesiological testing it was designed for. Future improvments on the control system aim to reduce high frequency jitter observed during operation that can be of annoyance to subjects.

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A COMPARATIVE CASE STUDY OF THE RISK AND CRISIS COMMUNICATION BETWEEN THE 2008 SALMONELLA OUTBREAK AND A LOCAL DAIRY RECALL

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BACKGROUND AND PURPOSE: It is estimated that 9.4 million people in the United States contracted a foodborne illness in the last year. These illnesses came from 31 major pathogens and caused over 55,000 hospitalizations and 1,351 deaths (Scallan, 2011). The role of crisis communication is to deliver information to various audiences to recover from a crisis, prevent a future crisis, even if they have never had to face one (Ferrante, 2010). The purpose of this study is to examine the risk and crisis communication efforts taken by public relations practitioners during a foodborne illness. **METHOD:** Specifically, this study will address the following research questions: 1) how did public relations professionals respond during a 2012 local dairy milk recall? 2) how did the crisis communication response during the 2012 local foodborne illness outbreak compare to the 2008 Salmonella outbreak 3) what can communication professionals learn about how to respond to local foodborne illnesses in the future? **RESULTS/FINDING:** Results from the interviews will be compared to major themes from a previous study with the 2008 Salmonella crisis. Anticipated results are that the public relations professionals involved in the crisis utilized a crisis communication plan and followed a strategic process for response. **CONCLUSIONS:** Because the local 2012 issue never received much media attention, researchers speculate the public relations professionals responded in a more strategic way than those involved in the 2008 crisis.

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LINKEDIN RESEARCH

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BACKGROUND AND PURPOSE: The purpose of this study was to evaluate if it would be prudent for the Department of Agricultural Communications and Journalism program to implement a LinkedIn page as part of their recruiting and networking efforts. The program already has a Facebook page and sends out printed material to prospective students. LinkedIn is older than Facebook; however, it had a slower evolution into mainstream media. Specifically, this research addressed the following research questions: 1) Is LinkedIn efficient means of networking and recruiting with prospective and former students? 2) What would the time commitment be for someone to maintain the LinkedIn account? **METHOD:** This research contained two parts. First, the researcher gathered what scholarly and popular information about LinkedIn as a recruitment and networking tool. A qualitative content analysis was utilized to identify major themes for the use of LinkedIn and higher education. Second, the researcher conducted a quantitative content analysis to determine how Kansas State University was using LinkedIn, in order to determine how many people are "connected to the University via LinkedIn. **CONCLUSION:** The results indicate LinkedIn would be worth the investment of time and resources for the Agricultural Communications and Journalism program. Kansas State University has 82,835 people on LinkedIn with more people added daily. The qualitative content analysis revealed that people are using LinkedIn as a means to present themselves professionally and this would be a great opportunity to connect with those.

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K-STCOLLEGE WOMEN'S WELL WOMAN HEALTH: CONNECTIONS WITH COMMUNCAITON, RELATIONSHIP, EFFICACY, AND BEHAVIOR

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BACKGROUND AND PURPOSE: Although there is a direct link between women's health awareness and their health behaviors, little is known about college-aged women's attitudes and behaviors regarding women's health. This study examined the communication, relationship, efficacy, and behavioral attitudes among college women. **METHOD:** A sample of 87 college-aged women from Kansas State University completed a 50-item self-report survey that measured communication patterns, relationships, efficacy, and behaviors about their health. Open-ended items were included to gain a deeper understanding of their understanding and actions towards women's health. **RESULTS/FINDINGS:** The findings show that women who discuss about their health frequently are more likely to have higher levels of efficacy and also likely to take part in preventitive measures. Peers and mothers seem to be the source of their well-women's health information and adivce. Concerning facts surfaced with only 9% of participants having previously engaged in conversations about preventative health measures, only 43% of participants had engaged in BSE (breast self-examiniation) in the past year, and only 41% of participants reported to have efficacious attitudes about their well-woman health. **CONCLUSION:** These outcomes suggest that there needs to be more information and education available for young women to learn about preventative measures about their well-woman health and communication is key to increase their efficacy and awareness.

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PHASES OF COPING FOR PARENTS OF A CHILD WITH A DEVELOPMENTAL DISABILITY: EXPLORING A NEW LIFESPAN MODEL

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BACKGROUND AND PURPOSE: Most literature identifies stages families go through when coping with a developmental disability diagnosis in a child. This literature primarily focuses on the initial reactions and adjustment process, as opposed to encompassing the changes that occur across the full lifespan. **METHOD:** The current study included a national sample of 643 participants who were parents of children diagnosed with Down syndrome. This study was part of a larger mixed-method research study of parents, which included quantitative measures of individual and relationship functioning and qualitative questions about their experiences in parenting a child with Down syndrome. **RESULTS**: ANOVA results indicated higher parental coping and hope scores during the middle childhood stage, with lower levels among parents of younger and older (adult) children, indicating an inverted U-shape in their levels of coping and hope across the lifespan. Qualitative analysis results support a similar pattern over the family life cycle. **CONCLUSION**: The current study provides a new model to further understand the unique needs of families with a child with a developmental disability diagnosis that may vary at different points across the lifecycle, providing important implications for further research and intervention programs.

TRAUMA DISCLOSURE: A COMPARISON OF TRAUMA SYMPTOMS AND RELATIONSHIP QUALITY IN MILITARY COUPLES

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BACKGROUND AND PURPOSE: Although the impact of war trauma has received a plethora of clinical and empirical attention focused on the individual, limited research addresses the couple and family system effects of trauma. The current research studied the effects of trauma disclosure using a mixed-method research design; to date, little research has addressed disclosure of trauma and the impact on individual or relationship functioning. **METHOD:** This study was part of a larger research study of military couples, which included quantitative measures of individual and relationship functioning and qualitative interviews with soldiers and their female partners to understand the individual and systemic impact of trauma. Participants' disclosure levels were coded based on their interview descriptions of their disclosure to their spouse. The coders classified each participant into one of two groups: low trauma disclosure (*n*=16) or high trauma disclosure (*n*=55) groups, based on the description of their trauma history disclosure to their spouse reported during their interviews. **RESULTS**: A one-way ANOVA was conducted, resulting in two statistically significant group differences: the low disclosure group reported significantly higher trauma symptom scores than the high disclosure group. For the qualitative data analysis, the high disclosure group reported better communication, adjustment, awareness, and cohesion, as a group, while the low disclosure group reported more impaired communication and increased conflict and role strain. **CONCLUSION**: The current research addresses the negative impact not disclosing one's history of trauma may have on individual and relationship functioning, particularly higher trauma symptoms and more impaired relationship functioning in couples.

AFFECTIVE RESPONSES TO VARIOUS EXERCISE TRAINING MODALITIES

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BACKGROUND AND PURPOSE: Exercise intensity is negatively related to pleasure, although self-selected intensity levels have increased tolerance for high-intensity exercise. This study examined affective responses to three types of exercise and preferences for continuing each type. **METHOD**: Eight college students (5 females, 3 males) were placed into three groups. Each group completed three types of exercise (three sessions each) in randomized order: moderate-intensity continuous cycling (MCT), high-intensity interval cycling (HIIT), and high-intensity functional training (HIFT; a combination of aerobic and resistance exercises). Participants completed the Borg Rating of Perceived Exertion Scale (RPE) for intensity, Feeling Scale for pleasure, and Felt Arousal Scale for arousal pre-warm-up, twice during exercise, immediately post-exercise, and after cooldown for each trial. Data analysis included repeated measures ANOVAs. **RESULTS**: Average RPE during exercise sessions was 10.8±2.0 for MCT, 12.3±2.8 for HIIT, and 14.2±0.8 for HIFT, with significant differences between MCT and HIFT (t=4.48, p<.05). Significant main effects were found for pleasure for MCT-session 2 (p<.05) and HIIT-sessions 2 and 3 (p<.05), where pleasure increased throughout. Significant main effects (p<.05) were also found for arousal in all sessions except MCT-session 1, where arousal increased throughout exercise and decreased post-exercise. No significant differences were found for preference of exercise type. **CONCLUSION:** Participants showed increases in pleasure during high intensity exercise without self-selecting intensity levels, indicating that exercise intensity is not always negatively related to exercise. Exposure to each exercise type may have been too short to develop a clear preference. Future studies with more subjects and longer duration may present more definite results.

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IMPLICATIONS FOR HIGH-INTENSITY FUNCTIONAL TRAINING WITH FOCUS ON STRENGTH GAINS IN BOTH EXPERIENCED AND NON-EXPERIENCED INDIVIDUALS

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BACKGROUND AND PURPOSE: High-intensity functional training (HIFT) has surged in popularity, yet key training effects are unknown. This study examined the effect of HIFT through CrossFit™ on strength gains over 6-months, accounting for experience and attendance. **METHOD**: Participants included 22 adults (36% female) ages 18-35. Experience was dichotomized as ≤12 months (n=14) or >12 months (n=8). Strength was assessed with 1 repetition maximum (RM) lifts for back squat (squat), overhead press (press), and deadlift using standardized warm-up and repetition progressions at baseline (B), 2 months (2M), and 6 months (6M). Both attendance for classes involving each lift and total attendance were recorded. Data were entered into SPSS for analysis. **RESULTS/FINDINGS**: On average, participants increased strength from B-6M for squat (m=18.2±17.1-lb, range=-25 to +45-lb,), press (m=6.0±8.1, range=-10 to +25,), and deadlift (m=17.1±24.9, range=-25 to +74,). Participants attended 0-14 squat (M=6. 0±3.5), 1-17 press (M=8.5±4.5), and 1-20 deadlift (M=11.1±5.4) classes; total attendance ranged from 15-90 (M=51.45±22.0) classes. Increases in press strength were correlated with attending more classes involving squat (B-2M; r=1.0, p<.001) and press (2M-6M; r=1.0, p<.001) movements. Using repeated measures ANOVA, significant main effects were found for all three lifts, press: $F(2,30)=3.70$, $p=.037$; squat: $F(2,18)=8.57$, $p=.002$; and deadlift: $F(2,2)=23.79$, $p=.040$. A significant interaction was found for press and experience, $F(2,30)=4.43$, $p=.021$, where those with ≤12 months experience had greater strength gains. **CONCLUSION**: HIFT participation elicits strength improvements, regardless of classes attended. The growth in popularity in HIFT could be due to continued strength gains in both novice and experienced persons.

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UNDERSTANDING THE RELATIONSHIP OF DIFFERENT NOVELTY ASSESSMENTS IN SPRAGUE DAWLEY RATS

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BACKGROUND: Novelty and sensation-seeking individuals are more likely to experiment with drugs and are more prone to drug addiction. Understanding the role that novelty/sensation-seeking plays in drug addiction is crucial for identifying individuals that may be predisposed. Animal models have been developed and have shown differing relationships with animal drug abuse models. The goal of this study was to examine multiple sensation-seeking animal assessments to understand the relationships between them and identify possible assessments that could be combined to predict drug vulnerability. **METHOD:** Thirty Sprague-Dawley rats were assessed in various novelty/sensation-seeking assessments including: inescapable novelty, to test the animals' response to a novel environment; novelty place preference, to test the preference for novel vs. non-novel environments; and a heterospecific assessment to test the animals' vocal response to novel and rewarding stimuli. In the heterospecific assessments ultrasonic vocalizations (USV) of all call types were measured. **RESULTS:** Bivariate correlations assessed the relationships among the screens and revealed significant correlations among the different novelty/sensation-seeking assessments. Interestingly, not all novelty assessments were related and some were negatively correlated, suggesting the assessments are measuring different aspects of novelty/sensation-seeking traits. **CONCLUSION:** The inescapable novelty and novelty place preference has predicted initial response to cocaine and amphetamine, and the transition to dependent drug taking, respectively. These assessments are not correlated, suggesting they are measuring different aspects of novelty, and thus will predict different aspects of drug abuse. The novelty place preference was related to the change in 50 kHz USV, suggesting these screens could combine to predict dependent drug taking.

THE EFFECTS OF ISOLATION ON PCREB EXPRESSION IN THE ABSENCE OF FEAR LEARNING

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BACKGROUND AND PURPOSE: Anxiety disorders are characterized by the expression of fear in non-threatening situations. Animal models suggest that differential housing during rearing can alter fearful behavior. Elevated expression of phosphorylated CREB (pCREB) in the nucleus accumbens (NAcc) has been implicated in the inability to inhibit an established fear response (Muschamp et. al., 2011). We conducted a previous study to determine whether environmental enrichment during rearing enhances this ability to extinguish fear. Isolated rats displayed elevated pCREB compared to enriched counterparts, suggesting a deficit in fear inhibition; however, it was not possible to verify whether pCREB expression differed in the absence of fear learning (Mersmann et. al., 2013). Therefore, the present study examines the effects of differential rearing on pCREB expression in the absence of fear learning. **METHODS**: Twenty-one day old male rats were raised in either an isolated or enriched environment. After the rearing period, rats received unpaired presentations of tones and mild foot shocks, but did not learn to form associations between the two. Brains were extracted and pCREB expression in the NAcc was quantified using immunohistochemistry. **RESULTS:** We hypothesize that there will be no differences in pCREB expression in the NAcc between enriched and isolated rats in the absence of fear learning. These anticipated results will support our hypothesis that isolation-induced pCREB expression in the NAcc increases the expression of fear and anxiety. **CONCLUSION:** These results may suggest that early rearing environments can alter neuronal functioning in adulthood and influence the development of anxiety-like disorders.

THE EFFECTS OF FLUOXETINE AND ENVIRONMENTAL ENRICHMENT ON THE EXPRESSION OF DEPRESSIVE-LIKE STATES IN MALE RATS

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BACKGROUND AND PURPOSE: There are multiple contributing factors involved in the development of depression. The environment and serotonin both play major roles in the progression of depression. Porsolt and colleagues (1977) originally developed the forced swim test (FST): the most widely used assessment for antidepressant-like behavior in rodents (Slattery & Cryan, 2012). While locomotor behavior is generally reduced as a result of antidepressant drugs, the effects of environmental enrichment on FST behavior are inconsistent. FST outcomes range from increased antidepressant-like states to no effect at all. Therefore, the current study focuses on the effects of fluoxetine and differential rearing on the FST and locomotor behavior. **METHOD:** At 21 days of age, male Sprague-Dawley rats arrived at the lab and were randomly assigned to an enriched (EC) or social condition (SC). Following 30 days of rearing, the effects of fluoxetine (20 mg/kg, i.p.) were assessed through a locomotor test session. After the locomotor screen, the effects of fluoxetine were measured through a 15-minute preswim, followed by injections of fluoxetine or saline 23.5, 5, and 1 hour(s) before a 5-minute test session. **RESULTS/FINDINGS:** Fluoxetine decreased locomotor activity in both environmental conditions. EC rats receiving control injections exhibited significantly more swimming than EC rats receiving fluoxetine. There were no significant differences in swimming or climbing between SC rats given fluoxetine or vehicle control. **CONCLUSION:** These results suggest that differential rearing has the ability to alter depressive-like states, and environmental enrichment may be more effective than fluoxetine (20 mg/kg) at preventing the expression of depressive-like states in male rats.

PARENTS OF CHILDREN WITH DOWN SYNDROME: A COMPARISON OF PRENATAL AND POSTNATAL DIAGNOSIS GROUPS

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BACKGROUND AND PURPOSE: The current literature addressing the intrapersonal and interpersonal functioning of parents of children with developmental disabilities, specifically Down syndrome, is limited. Much of the research is qualitative in nature and often does not address level of functioning in parents, particularly intrapersonal and interpersonal variables. In addition, most research includes either prenatal or postnatal participants, without comparing the unique experiences of these groups of parents, whose diagnosis experiences and outcomes may or may not be similar. Few recent studies comparing these two groups currently exist. **METHOD:** The study included a national sample of participants who learned of their child's diagnosis either from prenatal screening/testing (*n*= 285) or from a postnatal diagnosis (*n*=159). The main focus of this study included parents' coping strategies, hope, life satisfaction, relationship adjustment, and relationship satisfaction. **RESULTS**: These five variables were explored using ANOVA data analyses. The results indicated no statistically significant differences between the two groups on the measures. **CONCLUSION**: The study provides an initial quantitative analysis of parents' levels of functioning related to their child's Down syndrome diagnosis based on the timing of the diagnosis, which is currently absent in the literature.

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MEASURING SOYBEAN CYST NEMATODE POPULATIONS USING REMOTE SENSING
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BACKGROUND AND PURPOSE: The soybean cyst nematode (SCN) (Heterodera glycines Ichinohe) is an economically important pathogen of soybean (Glycine max [L.] Merrill) throughout the United States. This nematode caused annual losses of 152 million bushels in the United States during 1996-2010. Phenotypic characterization of genotypic resistance to SCN is labor intensive. Remote sensing technologies have the potential to characterize plant stress. These technologies may provide powerful tools for monitoring plant growth and development and for detecting plant disease caused by SCN in soybean. The objective of this study was to characterize differences in soybean cyst nematode (SCN) reproduction on soybean genotypes using remote sensing. **METHODS:** The experiment was conducted at three locations in Manhattan and Rossville in 2012 and 2013. Four soybean genotypes were planted in a randomized complete block design with ten replications. Initial and final SCN soil population densities and SCN root population densities were obtained. Canopy spectral reflectance and temperature were measured from R1 (beginning flowering) through R6 (full seed) on sunny days. **RESULTS/FINDINGS:** At R6 growth stage in Rossville 2013, canopy spectral reflectance in wavelengths; green (590 nm), red (665 nm), red edge (700 nm), and the near infrared region (810 nm) and canopy temperature were correlated with SCN root populations. **CONCLUSION:** Results indicated that it may be possible to characterize soybean cyst nematode reproduction in the field using spectral reflectance.

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VARIATION IN NITROGEN USE EFFICIENCY AND NITROGEN RESPONSE IN WINTER WHEAT VARIETIES COMMON TO THE CENTRAL GREAT PLAINS
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BACKGROUND AND PURPOSE: Increasing nitrogen use efficiency (NUE) in winter wheat can help producers reduce input costs associated with nitrogen fertilizers and reduce environmental risk of N loss. Many studies have investigated management impacts on NUE, however very few have investigated effects of crop genetics. The objective of this study was to determine if there are genetic differences in NUE among 30 wheat varieties commonly grown in the Great Plains. **METHOD:** The experiment was a field study in Rossville, Kansas with treatments consisting of N rate and variety. The wheat varieties were grown with two N rates, 0 lb N ac[-1] and 90 lb N ac[-1]. **RESULTS AND CONCLUSION:** Nitrogen use efficiency was calculated as the grain yield per unit of available nitrogen (sum of soil N and fertilizer N) and was significant with a $p=0.028$. Several other related parameters, such as nitrogen utilization efficiency, nitrogen remobilization efficiency, and biomass production efficiency were also significantly affected by variety with a $p<0.05$. These data suggest that there are significant genetic differences among varieties. A second nitrogen response study with only four varieties, including a full-height variety, was planted at both Silverlake and Ashland Bottoms, KS. This study had four nitrogen rates, 0 lb N ac[-1], 30 lb N ac[-1], 80 lb N ac[-1], and 130 lb N ac[-1]. The results show a significant difference in response among the varieties with a $p=0.045$, however the varieties performed differently at the two locations. Additional research will be needed in this study to establish relationships and draw solid conclusions.

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THE EFFECTS OF CANNING ON B –VITAMIN DEGRADATION IN A CAT FOOD DIET.

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BACKROUND AND PURPOSE: Cats require water soluble B-vitamins in their diet. Deficiency of thiamine, the most heat labile of the B-vitamins, results in neurological impairment, paralysis, and death within a month. Degradation of B-vitamins occurs during the canning process, resulting from high moisture levels, sterilizing heat cycles, pH fluctuations, and enzyme activity. The objectives of the following experiments were to evaluate the effect of batter moisture content, batter temperature and retort time on degradation of water soluble B-vitamins. **METHOD:** In experiment one, cat food was produced at batter moisture contents of 65, 75 and 85%, temperature of $60^{o}C$, and retort times of 45, 60, and 90 minutes at $125^{\circ}C$. For experiment two cat food was produced to a batter drop temperature of 50, 60, and 70 $^{\circ}C$, and retort hold times of 45, 60 and 90 minutes at $125^{\circ}C$. Foods were produced in a single batch and aliquots collected for each experimental treatment. Cans were seamed with a Dixie Seamer, and food was sterilized per protocol (time x temperature) in a Still retort. Samples were allowed to rest at least 48 hours prior to analysis. **RESULTS:** In experiment one, processing reduced thiamine, riboflavin, pyridoxine, folic acid, and vitamin B12 by 90.32%, 13.15%, 13.79%, 54.46% and 53.22% respectively ($P< 0.05$). For experiment two, processing reduced thiamine, riboflavin, pyridoxine, folic acid and vitamin B12 by 91.01%, 20.9%, 18.57%, 57.80% and 64.92%, respectively ($P< 0.05$). **CONCLUSION:** Canning (retort) decreased the retention of thiamine, folic acid, and vitamin B12 and must be corrected through supplemental fortification to avoid deficiencies.

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CHARACTERIZING THE EFFECTIVENESS OF COMMERCIAL HEAT TREATMENTS

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BACKGROUND AND PURPOSE: Heat treatment of a structure is an alternative method to using fumigants for pest control. Research at Kansas State University has shown that temperatures during practical heat treatments should be maintained within the range of 50-60°C for 24 h or less to be effective at eliminating stored product pests, including the red flour beetle (*Tribolium castaneum* (Herbst)). A lot of research has been conducted related to heat treatment in lab settings, but there is no published research related to commercial scale heat treatments. The purpose of this research was to analyze data collected at various commercial facilities and to evaluate the heat treatments conducted for their overall effectiveness against *T. castaneum*. **METHOD**: Bioassays containing different life stages of the red flour beetle were placed in different spots of the treated facilities. HOBO® temperature data loggers were placed next to each box to monitor the temperature at one minute intervals. At different time periods during the heat treatment, bioassays were collected for insect mortality assessment. **RESULTS**: A thermal death kinetic model predicted time to 99% mortality (LT_{99}) of *T. castaneum* young larvae, which is the most heat tolerant stage, as a function of time-dependent temperature data, at each location. The LT_{99} values were positively related to time to 50°C, but inversely related to time above 50°C and the maximum temperature. **CONCLUSION**: Temperatures observed, insect responses in bioassays, and thermal death kinetic model predictions confirmed that successful commercial heat treatments can be conducted in 24 to 28 h.

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EVALUATION OF COMMON ANALYSIS METHODS FOR OXIDATIONIN RENDERED PROTEIN MEALS USED TO PRODUCE PET FOODS

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BACKGROUND AND PURPOSE: Pet food uses a significant amount of rendered protein meal to meet the pets dietary protein and fat needs. These protein meals contain about 15-20% fat. This fat can oxidize rapidly if not properly preserved. Common methods to evaluate oxidation in commercial proteins are inconsistent. Therefore, our objective was to evaluate these methods to analyze fat quality in rendered protein meals from different animal sources and rendering plants. **METHOD:** In this study, samples of five chicken byproduct meals (CBPM) from each of three locations, and five beef meat and bone meals (BMBM) from each of two locations, and one turkey meal (TM) sample were evaluated. Samples were analyzed for peroxide value (PV) by two laboratories and by a rapid method (SafTest peroxysafe), anisidine value (AV), and thiobarbituric acid reactive substances (TBARS). **RESULTS:** The PV was 10.43, 58.07, and 6.65 meq/kg for CBPM, 4.65, 3.01, and 3.4 meq/kg for BMBM, and 11.5, 42.97, and 0.7 meq/kg, for TM samples at the KSU, external lab and SafTest methods. There was a direct correlation (r=0.96) between KSU data and the SafTest method, but not with the external lab (r=0.21). The PV from KSU lab was not correlated to the anisidine values (r=0.38). The Anisidine values were 2.07, 3.56, 0.64 and TBARS were 0.04, 0.06, and 0.06 for CBPM, BMBM, and TM, respectively. **CONCLUSION:** Initial testing confirmed PV is inconsistent and a better method to measure oxidative stability of these vital ingredients is needed.

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THE EFFECTS OF GELATIN AND EXTRUDER CONDITIONS ON FLOW PROPERTIES AND TEXTURE OF PET FOOD

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BACKGROUND AND PURPOSE: Pet food is a $21 billion industry in the U.S.. Recent product innovations have increased protein and decreased cereals, but diminished product durability and negatively changed kibble texture. Low-bloom gelatin is a pure protein that is used to improve some pelleted feeds. The objective of this project was to explore the use of low bloom gelatin (Pro-Bind Plus 100) in dry extruded pet food on kibble physical properties. **METHOD:** Two experiments were conducted on a Wenger X-20 single screw extruder. In experiement 1, 4 treatments were extruded at 400 RPM with 0% (CON), 5% (G5), 10% (G10), and 15% (G15) gelatin inclusion, and 15% gelatin at 500 RPM (500R) and 300 RPM (300R). Raw material was analyzed by Phase Transition Analysis (PTATM, Wenger Mfg.) and extrudates were analyzed for expansion ratio, bulk and piece density, specific length, hardness (TA-XT2, Stable Micro Systems), and pellet durability index (PDI) (Holmen NHP 100, Tekpro). **RESULTS:** Gelatin inclusion decreased flow temperature from 140°C for CON to 61°C for G5. Radial expansion decreased from 4.27 to 2.12 and specific length increased from 40.46 mm/g to 52.58 mm/g for CON and 300R, respectively. Additionally, hardness values increased from 5.14 kg to 10.85 kg for CON and 500R, respectively and PDI increased from 65% for CON to greater than 92% for all gelatin treatments. **CONCLUSION:** These results suggest gelatin acted as a plasticizer within the extruder and had some binding effect on finished product.

INFLUENCE OF SOYBEAN APHID BIOTYPES ON CHLOROPHYLL LOSS OF DIFFERENT SOYBEAN GENOTYPES

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BACKGROUND AND PURPOSE: The soybean aphid, *Aphis glycines* Matsumura**,** is a major pest of soybeans in North america. It is a serious pest since it may cause a yield reduction of more than 40% and also acts as vector of various plant viruses. They use piercing-sucking mouthparts to extract phloem sap from the plant tissues. The removal of phloem sap causes reduction in chlorophyll content and in turn affects photosynthetic rate. Therefore, it is important to measure the chlorophyll loss due to soybean aphid feeding. The objective of this study was to compare chlorophyll loss on resistant and susceptible genotypes due to two soybean aphid biotypes feeding. **METHOD:** The SPAD-502 chlorophyll meter was used to measure chlorophyll content on soybean genotypes. Chlorophyll content was measured on infested and uninfested leaves in no-choice tests for each biotype. Separate experiments were conducted for two biotypes to avoid chances of contamination. **RESULTS/FINDINGS:** The results showed that susceptible genotypes were significantly different ($P<0.05$) in their chlorophyll content between infested and un-infested leaves to the two biotypes (biotype 1 & 2), but the resistant genotypes were not showing any significant differences to these biotypes. Also between biotypes there were differences in amount of chlorophyll loss for soybean genotypes. **CONCLUSION:** Differences were detected in chlorophyll loss for various soybean genotypes and between aphid biotypes. Additional studies are required to identify more about feeding behavior of aphid biotypes, and its influence on chlorophyll loss and other biochemical changes in soybean genotypes.

DIVERSITY AND SIGNIFICANCE OF THE MICROBIAL COMMUNITY IN LARVAL DEVELOPMENT AND VECTOR COMPETENCE OF CULICOIDES SONORENSIS FOR EHDV

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BACKGROUND AND PURPOSE: The biting midge, *Culicoides sonorensis* is a vector of epizootic hemorrhagic disease virus (EHDV) that causes fatal infections in wild and domestic white-tailed deer and also affects mule deer, pronghorns, and cattle resulting in great economic losses in animal agriculture worldwide. We investigated the diversity and significance of the bacterial community in the larval development and the vector competence of *C. sonorensis* for EHDV-2. **METHODS:** Adult midges were trapped from dairy and deer farms, identified by sequencing of cytochrome oxidase (CO1), and the bacterial diversity in their gut and the larval habitat was assessed by a culturing approach followed by sequencing of 16S rDNA. Larval development studies were conducted with sterilized 1st instar larvae placed on a substrate made from autoclaved pond shore mud ($3/4$th) and unautoclaved manure ($1/4$th) of different animals. *Aeromonas veronii* isolated from the gut of wild midges was fed to teneral females in the lab. and its concentration was monitored after blood feeding and sugar feeding. **RESULTS:** *Culicoides sonorensis* was the most commonly found species in Kansas followed by *C. stellifer*, *C. crepuscularis*, and *C. haematopotus*. The dominant bacterial genus in the gut and larval habitat of *C. sonorensis* was *Aeromonas* sp. and *Pseudomonas* sp., respectively. *A. veronii* population reached its peak on day 1 post-blood feeding ($\sim10^8$ CFU per midge), then declined and stabilized ($\sim10^6$ CFU per midge). **CONCLUSIONS:** *Aeromonas* sp. is a candidate for paratransgenic approach to minimize EHDV transmission and *Pseudomonas* sp. for the midge larval development inhibition studies.

BLOCKADE OF ATP-SENSITIVE POTASSIUM CHANNELS IMPAIRS VASCULAR CONTROL IN EXERCISING RATS

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The ATP-gated potassium (K_{ATP}) channel is a class of inwardly rectifying K^+ channels which mediates smooth muscle cell hyperpolarization and may link cellular metabolic status to vasomotor tone across the prodigious metabolic transients seen with exercise. **PURPOSE:** We hypothesized that blockade of K_{ATP} channels via glibenclamide (GLI) would lower hindlimb muscle blood flow (BF) and vascular conductance (VC) during submaximal exercise in healthy rats. **METHODS:** In adult male Sprague Dawley rats mean arterial pressure (MAP), blood [lactate], and hindlimb muscle BF (radiolabelled microspheres,) were determined either at rest ($n=6$) or during exercise ($n=8$; 5% incline, 20 m·min^{-1}) under both control (CON) and GLI conditions (5 mg·kg^{-1}, i.a). **RESULTS:** At rest and during exercise, MAP was higher (Rest, CON: 130±6, GLI: 152±8; Exercise, CON: 140±4, GLI: 147±4 mmHg, $p<0.05$) and heart rate (HR) was lower (Rest, CON: 440±16, GLI: 410±18; Exercise, CON: 559±4, GLI: 538±10 bpm, $p<0.05$) with GLI. Hindlimb muscle BF (CON: 144±10, GLI: 120±9 ml·min^{-1}·100g^{-1}, $p<0.05$) and VC (CON: 1.05±0.08, GLI: 0.83±0.08 ml·min^{-1}·100g^{-1}·mmHg^{-1}, $p<0.05$) were lower with GLI during exercise but not at rest ($p>0.05$). Specifically, GLI decreased BF in 12, and VC in 16, of the 28 individual hindlimb muscles or muscle parts during exercise ($p<0.05$). During exercise [lactate] (CON: 2.0±0.3; GLI: 4.1±0.9 mmol·L^{-1}, $p<0.05$) was higher with GLI. **CONCLUSION:** These data indicate that K_{ATP} channel blockade with GLI attenuates the muscle BF response to submaximal exercise in healthy animals. Our results suggest that K_{ATP} channels are obligatory for exercise induced hyperemia.

DEVELOPMENT OF DIAGNOSTIC REAGENTS AND ASSAYS FOR DETECTION OF PORCINE EPIDEMIC DIARRHEA VIRUS INFECTION

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BACKGROUND: The porcine epidemic diarrhea disease virus (PEDV) has recently been detected in the US swine herd. Rapid diagnosis of PEDV infection is critical to control the spreading of the disease. Although PEDV has been endemic in Europe and Asia, due to biosecurity reasons, diagnostic reagents and materials are difficult to import to the US. The PEDV control and prevention in the US is hindered by a lack of key reagents and validated diagnostic assays. Therefore, the objective of this study is to develop a panel of selected diagnostic reagents and assays for PEDV detection. **METHODS:** Three PEDV antigens have been expressed in an *E. coli* expression system, including nucleocapsid (N), membrane (M) and spike (partial, S1) proteins. A rabbit polyclonal antibody against M protein is generated. Using the N protein, a fluorescent immunomicrosphere assay (FMIA) has been developed. **RESULTS:** Based on a preliminary evaluation of 171 serum samples from experimental infected animals, the N protein-based FMIA achieved 95.5% sensitivity and 96.5% specificity. Serum antibodies specific to N proteins were detected as early as 14 days post infection. In the meantime, parallel ELISA and immunofluorescent assays (IFA) have also been developed. Results from these three serological assays are correlated well (kappa values greater than 0.9). **CONCLUSION:** Currently, we are adapting our established technologies to develop a multiplex FMIA to simultaneously detect PEDV, porcine reproductive and respiratory syndrome virus (PRRSV), swine influenza virus (SIV) and porcine circovirus (PCV2). This panel of reagents and assays provide important tools for PEDV diagnosis and surveillance in the US.

STABLE POLYMERIC MEMBRANES PREARED FROM MATRIMID/P84 BLENDS

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BACKGROUND AND PURPOSE: Polymeric membranes have been used for the separation of gas and liquid mixtures. Most commercial applications are for temperatures near atmospheric conditions and for aqueous liquid mixtures. As polymeric membranes advance into new application areas, the thermal and chemical reistance of these membranes must be improved. In this study, blends of two polymers are produced and evaluated. Matrimid, a polyimide with good permeation properties, was blended with P84 to enhance chemical resistance. While some preliminary work on the preparation of membranes from these polymer blends has appeared, there are no reports of the resultant physical properties of the blends. In this study, blend films of Matrimid and P84 ranging from 0 to 100% Matrimid are characterized. **METHOD and RESULTS:** The polymers were dissolved in n-methyl pyrollidone and cast as dense films. Following complete solvent removal, the packing characteristics of each blend was measured as was the resultant density, glass transition temperature, solvent sorption levels, and the permeability of the blend films to hydrogen, nitrogen, carbon dioxide, and methane. **RESULTS/FINDINGS:** As the two polymers have similar chemical structures, there is little variability in the polymer chain packing with blend composition. On the other hand, the chemical resistance and gas permeation properties are strong fuctions of blend composition.

COMPUTER SIMULATION OF MULTICOMPONENT OSMOTIC SYSTEMS

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BACKGROUND AND PURPOSE: Most cellular processes occur in systems containing a variety of components, many of which are open to material exchange. However, computer simulations of biological systems are almost exclusively performed in systems closed to material exchange. In principle, the behavior of biomolecules in open and closed systems will be different. **METHOD:** Here, we provide a rigorous framework for the analysis of experimental and simulation data concerning open and closed multicomponent systems using the Kirkwood-Buff (KB) theory of solutions. The results are illustrated using computer simulations for various concentrations of the solutes Gly, Gly2, and Gly3 in both open and closed systems, and in the absence or presence of NaCl as a cosolvent. In addition, KB theory is used to help rationalize the aggregation properties of the solutes. **RESULTS AND CONCLUSION:** Here, one observes that the picture of solute association described by the KB integrals, which are directly related to the solution thermodynamics, and that provided by more physical clustering approaches are different. It is argued that the combination of KB theory and simulation data provides a simple and powerful tool for the analysis of complex multicomponent open and closed systems.

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EVALUATING THE CONTRIBUTIONS OF ATMOSPHERIC DEPOSITION OF CARBON AND OTHER NUTRIENTS TO NITRIFICATION IN ALPINE ENVIRONMENTS

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BACKGROUND AND PURPOSE: The Colorado Front Range of the Rocky Mountains contains undeveloped, barren soils, yet in this environment there is strong evidence for a microbial role in increased nitrogen (N) export. Barren soils in alpine environments are severely carbon-limited, which is the main energy source for microbial activity and sustenance of life. It has been shown that atmospheric deposition can contain high amounts of organic carbon (C). Atmospheric pollutants, dust events, and biological aerosols, such as bacteria, may be important contributors to the atmospheric organic C load. **METHOD:** In this stage of the research we evaluated seasonal trends in the chemical composition and optical spectroscopic (fluorescence and UV-vis absorbance) signatures of snow, wet deposition, and dry deposition in an alpine environment, at Niwot Ridge in the Rocky Mountains of Colorado to obtain a better understanding of the sources and chemical character of atmospheric deposition. **RESULTS/FINDINGS:** Our results reveal a positive trend between dissolved organic carbon concentrations and calcium, nitrate and sulfate concentrations in wet and dry deposition, which may be derived from such sources as dust and urban air pollution. We also observed the presence of seasonally-variable fluorescent components that may be attributed to fluorescent pigments in bacteria. **CONCLUSION:** These results are relevant because atmospheric inputs of carbon and other nutrients may influence nitrification in barren, alpine soils and, ultimately, the export of nitrate to alpine watersheds.

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CRASH AND INJURY REDUCTION FOLLOWING INSTALLATION OF ROUNDABOUTS AT STATE HIGHWAYS IN KANSAS

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BACKGROUND AND PURPOSE: Nearly half of all motor vehicle crashes which result in injuries occur at intersections. In the state of Kansas in 2012, 56,489 crashes occurred, 17,386 crashes occurred at intersections and/or were intersection related. These crashes included 81 fatal crashes and 5,233 injury crashes. Traffic signals and stop signs are the primary controls used to regulate traffic flow at intersections to prevent collisions between conflicting traffic movements. Throughout the rest of the world, modern roundabouts have become increasingly popular as an alternative to intersections with traffic signals and stop signs, but they are seldom used in the United States. This study evaluates changes in motor vehicle crashes following the conversion of intersections from stop sign and traffic signal control to modern roundabouts in Kansas. **METHOD:** In order to evaluate the effectiveness of roundabout installation, a before-after study using a paired t-test was conducted on frequencies, severities and different types of crashes were occurred in before and after installations of roundabouts. **RESULTS/FINDINGS:** However the results did not show any significant reduction in crash frequencies, but before-after study showed a highly significant reduction in crash severities after installation the roundabouts. Angle crashes as a most common crash type at intersections have significantly reduced after the roundabout installation. **CONCLUSION:** similar to numerous international studies, this study suggests that roundabout installation should be promoted as an effective safety treatment for intersections.

PREDICITVE ANALYTICS IN DIGITAL SIGNAL PROCESSING: A CONVOLUTIVE MODEL FOR POLYPHONIC INSTRUMENT IDENTIFICATION AND PITCH DETECTION USING COMBINED CLASSIFICATION

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BACKGROUND AND PURPOSE: Pitch detection and instrument identification can be achieved with relatively high accuracy when considering monophonic signals in music; however, accurately classifying polyphonic signals in music remains an unsolved research problem. Pitch and instrument classification is a subset of Music Information Retrieval (MIR) and automatic music transcription, both having numerous research and real-world applications. Polyphonic signals with many different voices and frequencies can be exceptionally complex. **METHOD:** Presented is a new model for representing the spectral structure of polyphonic signals: Uniform MAx Gaussian Envelope. This method approximates the distribution of frequency parts in the spectrum while being resilient noise and is able to generalize well without losing the representation of the original spectrum. Compared to other methods, such as linear predictive coding and the cepstrum envelope, UMAGE models high order polyphonic signals without independent of the signal's periodicity. **RESULTS/FINDINGS:** The performance of UMAGE is evaluated both objectively and subjectively. It is shown that UMAGE is robust at modeling the distribution of frequencies in simple and complex polyphonic signals. Combined classification (combiners) is used to simplify the learning process and boost classification results. UMAGE is less accurate when identifying pitches; however, it is able to achieve accuracy in identifying instrument groups on order-10 polyphonic signals (ten voices), which is competitive with the current state of the field. **CONCLUSION:** While this method focusses predicting current pitches and instruments based on a priori data, it may also be adapted to predict future events for other applications, such as pitch tracking.

MINIMIZATION OF POWER LOSS AND HARMONIC DISTORTION IN GRID-TIED CASCADED MULTILEVEL INVERTERS

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BACKGROUND AND PURPOSE: Multilevel inverters are implemented in high-power, high-voltage electric utility systems, especially in DC power transmission lines, as well as distributed generation systems where renewable energy resources are connected to the grid. Multilevel inverters have several advantages when compared to conventional two-level inverters, including less stress on semiconductor switches and less total harmonic distortion at the inverter output waveforms. As the number of levels increases, the inverter output voltage becomes closer to a pure sinusoidal waveform by choosing proper switching angles. In order to find proper switching angles, a set of nonlinear equations needs to be solved, where single objective optimization techniques are applied. Moreover, PWM techniques can be superimposed on the switching pattern of multilevel inverters to further reduce harmonics, whereas higher the PWM frequency means more the switching loss. In other words, switching loss and harmonic distortion are two conflicting features in PWM-based multilevel inverters. Thus, a multi-objective optimization technique needs to be applied to find proper switching angles and PWM indices for multilevel inverters. **METHOD:** In this study, an NBI-based two-objective optimization technique has been presented to minimize two conflicting features, power loss and total harmonic distortion, of grid-tied PWM-based cascaded multilevel inverters. **RESULTS AND CONCLUSION:** Due to nonlinear behavior of PWM-based inverters, power loss and total harmonic distortion, cannot be expressed simply by mathematical formulas. Thus, the modified normalized boundary intersection technique has been developed and applied in this work as the chosen solution. The proposed technique has been verified by simulated data.

IDENTIFYING ELEMENTARY PARTICLES FROM HIGH ENERGY COLLISIONS PRODUCED BY THE LARGE HADRON COLLIDER AT CERN

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BACKGROUND AND PURPOSE: The Large Hadron Collider (LHC) is the largest particle accelerator in the world that gives a unique opportunity to study the physics at the highest energy achieved by mankind. Data from the LHC collisions reconstructed by the CMS detector already led to a discovery of the Higgs boson (Nobel prize in physics in 2013) and many other discoveries are anticipated soon. In order to maximize the discovery potential of the CMS detector, it is crucial to fully capitalize on the hardware capability to reconstruct particles produced in the collisions. **METHODS/RESULTS:** I developed a new method to improve the identification of the low-energy electrons produced in heavy flavor quark decays, important to identify heavy flavor quark decays and to properly account for the energy flow in the collision. Identification of electrons in a quark fragmentation environment (jets) is highly challenging as other particles can mimic electron experimental signature. I used both simple selection and multivariate techniques to vastly improve the performance of the electron reconstruction. This new algorithm was implemented in C++ and is now a part of the official CMS electron reconstruction software. **CONCLUSION:** A new method is developed to identify in proton-proton collisions with the CMS detector. The new selection criteria perform much better: for the same reconstruction efficiency, the contribution from pions misidentified as electrons is reduced by a factor of two. This study directly impacts on the discovery potential of the future operations of the LHC complex in 2015.

EXPLORATION OF NATURAL DYES FROM NATIVE KANSAS WALNUT, OSAGE ORANGE, AND CEDAR SAWDUST ON COTTON YARN FOR USE IN A HAND-WOVEN GARMENT.

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BACKGROUND AND PURPOSE: Artisan weavers often use natural dyes to color their yarn; however, fewer have explored color derived from sawdust waste. In addition, weavers often translate hand-woven cloth into rectangle shaped garments with limited exploration of fitted garments. Thus, the purpose of this project was to (a) explore yarn dyeing using native Kansas Black Walnut (Jugalns nigra), Osage orange (Maclura pomifera), and Eastern Red Cedar (Juniperus virginiana) sawdust and (b) create a fitted garment from the woven cloth.   Inspiration was from photographs taken of local trees. **METHOD:** This study utilized Naturalistic Inquiry methodology due to the role of the designer/researcher generating outcomes in a natural setting, rather than a controlled laboratory. Methods included the sampling of dye color on aluminum acetate mordanted and nonmordanted cotton yarns, exploring color and weave patterns through physical and digital sampling, and experimenting with garment design through mock-ups. **RESULTS AND CONCLUSION:** Mordanted walnut and cedar yarns were light brown with a blue cast, providing subtle color variation when paired with nonmordanted walnut dyed yarns. Osage orange dyed yarns were eliminated as the bright golden yellow clashed with the muted walnut and cedar browns. A herringbone twill weave structure in alternating stripes of dark and light was the selected pattern woven into fabric 22" x 72". A fitted jacket and shorts were constructed from the woven textile. The final ensemble resembled the tree inspiration through color and pattern. Recommendations for fitted garments are to use an underling to prevent the textile from stretching.

ANTECEDENTS OF ACQUIRING REUSED JEANS: DEVELOPING HYPOTHESES AND RESEARCH MODEL ON THE ROLE OF PERCEIVED CONSUMER EFFECTIVENESS, SELF-EFFICACY, AND EGO-DEFENSIVENESS

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BACKGROUND AND PURPOSE: With an intensified focus on sustainability in the past few decades, governments, marketers, and individuals have become increasingly aware of the necessity to reduce our environmental footprint. Consequently, many stakeholders are interested in finding the determinants of sustainable purchase behaviors, including apparel products. Among environmentally sustainable consumer behaviors are recycling, consumption reduction, and reusing- this paper focused on the behavior of reusing, and even more specifically, reusing clothing which has a comparatively durable lifetime (e.g., jeans). Therefore, the purpose of this study was to determine the effects of the three variables of perceived consumer effectiveness (PCE), self-efficacy, and ego-defensiveness on consumers' willingness to acquire reused jeans. **METHOD:** Through a detailed literature investigation, this paper reviewed conceptual and empirical literature to determine 39 green-concern antecedents, from which aforementioned three variables were studied to explain attitudes towards reused jeans and engagement in acquisition of reused jeans. **RESULTS/FINDINGS:** Based on the literature review, a research model is presented and three hypotheses developed to test and profile eco-conscious consumers. **CONCLUSION:** The finding is expected to help in determining mechanisms for firms and charities to profile the young consumer and to position them in acquiring reused jeans more effectively.

AN ANALYSIS OF BENEFITS SOUGHT WITHIN THE SMART CLOTHING MARKET: A CASE STUDY OF SMART SPORTSWEAR

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BACKGROUND: Designing smart clothing with added technology such as wires and circuits allows garments to respond to environmental stimuli. As more flexible technologies and smart clothing are developed, a gap exists in identification of the end-users' needs. Current smart clothing research is considered on a product-oriented basis rather than from the end users' view point. **PURPOSE:** The purpose of this study is to develop a product development model for smart sportswear that incorporates consumer needs. A secondary purpose is to provide a path to develop smart clothing marketing strategies. **METHOD:** Current innovations and market developments of smart sportswear were examined through a review of the technical literature related to smart clothing. Consumer behavior towards smart sportswear was analyzed through a review of social and behavioral science literature. These findings were then integrated and synthesized for model development purposes. **FINDINGS:** Based on the literature review, the researchers propose a new product development model that combines the functional apparel product development process with the technology acceptance model. Consumer needs and preferences are critical and should be included in the design of both the clothing and the electronic components, rather than solely focusing on the product. Through the literature review it was found that a cross-way communication flow between consumers, the smart sportswear market, and functional clothing product developers is necessary in smart clothing marketing. **CONCLUSION:** Through this model, new markets can be identified and smart sportswear can shift from a niche market to mass market. Future research should test the model in the development of smart sportswear.

EXPLORATION OF THE EFFECT OF SOCIAL NETWORKING SITES ON ENVIRONMENTALLY SUSTAINABLE APPAREL PURCHASE INTENTIONS

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BACKGROUND: With the apparel and textiles industry the second leading cause of industrial harm to the environment, the call to action to influence consumer demand for environmentally sustainable apparel (ESA) is essential for the well-being of both the environment and humankind. Social networking sites (SNS) are a potential advocacy mechanism for increasing awareness of and demand for ESA. **PURPOSE:** The purpose of this paper is to review the literature regarding ESA acquisition and develop a model to communicate the potential effects SNS can have in terms of increasing knowledge of and attitudes towards ESA. More specifically, because SNS rapidly communicate to consumers the attitudes and opinions of their online referent groups, this study aims to understand the potential for the social influence of SNS to impact consumer purchase intentions (CPI) and create consumer demand for ESA. **METHOD:** Through a detailed literature investigation, the Theory of Reasoned Action (TRA) model initially proposed by Azjan and Fishbein (1980) has been altered to incorporate SNS as an important variable influencing CPI of ESA. **RESULTS/FINDINGS:** Based on the literature review the researchers propose that SNS are viable mechanisms for influencing CPI of ESA. In applying TRA, the researchers propose that by providing knowledge in an online, socially influential way to consumers through SNS, it should be possible to guide attitudes and increase the demand for ESA. The developed model illustrates these potential relationships. **CONCLUSION:** Future research should test the model by utilizing survey research methods with a random sample of US consumers.

DESIGNING OUTDOOR SPACES TO ENHANCE URBAN INTER-GENERATIONALLIVING

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BACKGROUND AND PURPOSE: The functioning and maturation of the human body, mind, and spirit depend on the quality of people's ongoing experiences of nature. (Kellert, 2005) The incorporation of nature into living spaces can greatly enhance psychosocial relationships in inter-generational living. Healing gardens used in healthcare facilities have proven beneficial to people of all ages; medical and other scientific studies have shown that environmental design can increase a person's physical and mental health. (Ulrich, 1999) Natural environments also prove to be beneficial to children. Play therapy helps children develop self-confidence, a positive self-image, learn to express feelings, and make decisions. (Framingham, 2013) Gardens are important and effective for fostering social contact as well as supporting emotional interactions known to mitigate stress. (Ulrich, 1999) Overall, nature can positively impact a user's quality of life. **METHOD:** A thorough review of the literature will help define how to successfully organize and layout outdoor spaces in inter-generational living. Maximizing the usability of outdoor spaces is essential for the users' health. **RESULTS/FINDINGS:** The design of outdoor spaces brings people of all ages together in a healing environment. **CONCLUSION:** The purpose of this study is to explore how the design of outdoor spaces can be integrated into future inter-generational living projects in order to benefit the well being of all users.

INTERSTITIAL SPACE TO PROMOTE SOCIAL HEALTH IN INTER-GENERATIONAL LIVING ENVIRONMENTS

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BACKGROUND AND PURPOSE: Intergenerational living can be described as living together in a model of cooperation, interaction, and exchange that facilitate mutual support and relationships which benefit both individuals and their communities (Generations United). Social networks and community support are necessary to maintain close relationships, purposeful life, and general well being (Rowe). Such relationships should be facilitated by the design of space (Osmond), thus made a part of the everyday life. The question becomes how design can facilitate these relationships. This project is based on the premise that interstitial space, defined as "in-between" spaces that connect different realms, in particular should employ such design strategies. The reasoning is that the adjacency of varied activities creates the potential for particularly enriching interactions. **METHOD** The project first attempts to identify, through literature review, the design characteristics that encourage and allow people to occupy a space, thus providing the potential for social interaction. Then, once identified, precedent was anaylzed to determine the way these characteristics have been used successfully and unsuccessfully. **RESULTS/FINDINGS:** The ultimate goal of this research is to, through the analysis of precedent, research studies, and past theories, determine strategies for socially successful living environments. Then the project proposes to refine these strategies through design exploration. **CONCLUSION:** The result of this research will be a model for successful intergenerational living, hopefully one that inspires future projects and research.

INTER-GENERATIONAL LIVING: OPEN BUILDING ARCHITECTURE AND THE IMPORTANCE OF CHOICE & INDEPENDENCE
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BACKGROUND AND PURPOSE: The ideas of choice and personalized living; that people carry an inherent emotional connection with their physical environment, has forever been at the of American homeowner ideology (Marcus 2006). "Open building architecture", an approach to design that increases the variety, flexibility and quality of space, ensures the idea of choice and personalization in living for the inhabitant (Nascimento 2013). The notion of applying a singular scheme to the living needs of the greater whole can no longer be an acceptable means of designing. In the sector of healthcare (hospitals, nursing homes, etc.) this similar quality of homogenized living conditions, void of any personal identity, has come to be all too familiar (Swensson 2012). **METHOD:** Through the implementation of open building architecture, one can break free of the cookie cutter approach to design and begin to disentangle the specific parts of a building, thus enabling broader consumer choice in laying out, equipping, and furnishing space (Kendall 2002). **RESULTS/FINDINGS:** In regards to inter-generational living, the aspect of adapting to changing needs over time is critical in order to adequately serve the needs of our aging population, and by means of open building architecture, one can begin to focus design on the user/inhabitant. The users, then, become recognized as the decision making agents, and in turn the architecture becomes more suitable to the individual's needs (Nascimento 2013). **CONCLUSION:** Thus, the purpose of this project is to investigate the potential benefits of open building architecture in the design of inter-generational living, with the goal being to sustain choice, personalization, and independence for its inhabitants.

CREATING A HEALING SENSE OF PLACE THROUGH INTER-GENERATIONAL HEALING
Wilson Meeks III

This project is based on the notion that an environment which expresses a healing sense of place can positively affect a person's wellbeing through sensory experiences. Gesler describes the healing environment as being comprised of four main aspects: built, natural, social, and symbolic (Gesler, 2003); which contribute to the character of that environment. A place becomes significant in character when people are able to develop their own sense of personal identity, security, and belonging from that environment (Pred, 1983). Typically, sensory experiences are best achieved through the built environment, as many sanatoriums built during the birth of modernism were designed to affect the senses of the human body (Gesler, 2003). This is a haptic architecture; which recognizes the realms of hearing, smell, and taste, in addition to sight (Pallasma, 1994). Sensory experience is translated through the body, allowing the body to be effected as a result of environment. Healing is achieved through the application of a set of design principles, most of which are used often in design. These principles are: create a building that responds to the vernacular of the area, provide significant framed views in living and social spaces, express the significance of a space through the entrance or "threshold," and keep social activity the center of your healing experience. The intergenerational living project in Seattle, Washington created an environment of social and physical healing that can experienced by the young and old alike.

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SILENT ARCHITECTURE: HEALING IN AN INTERGENERATIONAL LIVING ENVIRONMENT
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BACKGROUND AND PURPOSE: "The most powerful of healing places is in the brain and in the mind." Studies have shown that the mind and its functions are directly affected by the environment. Certain environmental stimuli, such as light and sound, affect the hormone levels in the brain. These chemicals drive reactions and can either help or hinder healing. Healing can be defined as an internal process of transformation. Silent Architecture may be a way to promote this process toward well-being. **METHOD:** As defined by Christopher Day, Silent Architecture is balanced, simple, and timeless. Scale, proportion, "living lines", unity of colors and materials are strategies that can positively impact psychological well-being. Literary research and precedent studies have shown that Silent Architecture evokes a sense of calm and peacefulness in those who experience it. **ANTICIPATED RESULTS AND CONCLUSION:** These perceptions can be especially important to older generations. In an intergenerational living environment, the difference of ages is emphasized, and stress over changes that come with age can become prevalent. Design that takes these issues into consideration should share qualities with the idea of Silent Architecture. It is suggested that the design of space can encourage a healing or calming effect in its inhabitants. This project will explore how Day's principles of Silent Architecture can inspire healing and well-being in an intergenerational living environment.

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CAPTURING THE BUZZ: SOCIAL MEDIA AS A DESIGN INFORMANT FOR URBAN CIVIC SPACES
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BACKGROUND AND PURPOSE: Civic spaces are important nodes of community life. Especially in an urban context, civic spaces provide a necessary place that people can gather for events, meet others, and experience openness in an otherwise crowded environment. However, not all civic spaces are successful in providing these opportunities to city dwellers. Washington Square in Kansas City, Missouri is one such civic space that is currently unsuccessful. Urban planners and designers utilize citizen input in order to design places that work well in their native context. However, traditional methods of obtaining citizen input do not always yield the richest information. Analyzing social media posts submitted within civic spaces may be one way to discover more insightful opinion about urban civic spaces. **METHODS:** Instagram photos and tweets will be collected within the geographic boundaries of Washington Square and three successful case study civic spaces. Using a two-step content analysis, these photos and tweets will be analyzed to discover themes of what users are experiencing in these civic spaces. This data will be compared to additional data gathered from a social media campaign to collect more public opinion of Washington Square and recommendations for the redevelopment of this civic space. **ANTICIPATED FINDINGS & CONCLUSION:** Through this research, it is expected that the public opinion gathered from the social media data will align with the principles of urban design. Demonstrating that social media data can provide alternative and useful information to traditional methods of citizen input affords planners and designers new methods of informing their designs.

MEASUREMENT OF BUILT ENVIRONMENT THAT SUPPORT PHYSICAL ACTIVITY IN LOW-INCOME COMMUNITIES

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BACKGROUND: Physical activity (PA), an important factor in disease prevention and health promotion, can be largely affected by the built environment. As part of a 5-year multi-state adolescent obesity prevention project, the availability, safety and quality of PA related resources and street environments were assessed in both urban and rural low-income communities in Kansas, South Dakota, and Ohio (KS, SD, and OH). Each state had one control and one intervention community. **METHOD:** In-person audits of street segments (n = 47 and n = 37, respectively for control and intervention communities) and parks (n = 20 and n = 12) were conducted by trained observers using validated Physical Activity Resource Assessment (PARA) and Active Neighborhood Checklist (ANC) to accurately reflect neighborhoods' current conditions. **RESULTS:** There were no statistical differences in the mean PARA and ANC scores for control and intervention communities in KS, SD, and OH individually by state or combined (p > 0.05). The major PA structures available in both control and intervention communities were playsets (72.5%) and basketball courts (51.0%). Sidewalks and stop signs were present in 78.5% and 69.0% of assessed segments respectively, to promote neighborhood safety for walking/cycling. The overall quality of PA resources assessed was in good condition (85.9%) and without major street-level defect (90.4%). **CONCLUSION:** The built environments for PA among all three states were similar. These finds suggest future studies on the perceived measures of the built environment are required to understand how improvements made in intervention communities to promote PA could increase levels of PA in adolescents.

PROSODY IN CHILDREN WITH ASD IN NARRATIVE AND FIGURATIVE CONTEXTS

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BACKGROUND AND PURPOSE: Prosody encompasses the suprasegmentals of speech (e.g., fundamental frequency, intonation, speech rate, and stress patterns). Individuals with autism spectrum disorder (ASD) often demonstrate atypical prosody (McCann & Peppe, 2003). This use of atypical prosody may lead to breakdowns in communication when interacting with individuals who have ASD. Prosody in speakers with ASD, mapped onto specific communication functions (e.g., sarcastic speech), needs to be explored. The study explored if children with ASD demonstrated prosodic variations different from their typically developing peers during a narrative task involving sarcastic, humorous, and literal utterances. **METHOD:** 4 children with ASD were compared with 2 typically developing peers. Three books were selected for children to read aloud. Each book contained a target word in sarcastic, humorous, or literal contexts. Audio clips of the target words were analyzed using PRAAT software for fundamental frequency, intensity, and duration. **RESULTS:** Differences were found between the two groups for mean, minimum, and maximum fundamental frequency. Group differences were also found for mean, minimum, and maximum intensity. The duration of the target word was shorter in sarcastic contexts than in literal contexts. **CONCLUSION:** This study demonstrated that speakers with ASD showed differences from their typically developing peers in measures of prosody during a narrative task. These results supported previous literature (McCann & Peppè, 2003), which found that individuals with ASD employed prosody that differed from their peers. Results provide the foundation for further analysis of the prosody used by children with ASD as well as clinical implications for assessment and intervention.

ATTRIBUTION OF RESPONSIBILITY IN THE MEDIA COVERAGE OF NUCLEAR ACCIDENTS

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BACKGROUND AND PURPOSE: Disaster at the Fukushima Daiichi nuclear plant in the spring 2011 brought severe threat of nuclear crisis not only to Japan but to the whole world. Along with the Chernobyl catastrophe in Soviet Union in 1986 and the accident at Three Mile Island in the U.S. in 1979 these three nuclear disasters contribute to the ongoing nuclear discourse. This study analyzes U.S. media coverage of the nuclear accidents at Three Mile Island, Chernobyl and Fukushima Daiichi in order to understand how media attribute responsibility for the accident. The nature of the media and the fundamental role it plays in the discussion and dynamic of important events make it one of the most powerful factors shaping public opinion and therefore an important subject for research. **METHOD:** This study accomplishes content analysis of the 60 articles from the *The New York Times* selected from the period of initial coverage of each accident. It employs framing theory and examines causal and treatment responsibilities for the disaster. **RESULTS AND CONCLUSION:** The major finding of this research emerged in the media coverage of Chernobyl disaster. Here media tend to attribute responsibility for both cause and management of the accident to the government more than in the coverage of two other accidents.

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SOCIAL IDENTITY, THEMES OF BLAME, AND CREATING SOCIAL MOVEMENT MOMENTUM: REMEMBRANCE AND ANALYSIS OF THE "MONTANA CASE"

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BACKGROUND AND PURPOSE: In 1995, child sexual abuse was deemed "a silent, violent epidemic" by the American Medical Association (Chasa-Taber and Tabachinck, 1999). An epidemic requires a social movement to reverse the effects (Miller, 2002, Kumayika 2009). Social movement participation is influenced by collective identities (Pollenta and Jasper, 2001). The Internet has evolved into a space where media and public can almost freely interact with the explosion of user-generated content (O'Reilly, 2005). **METHOD:** This research employs the content analysis of user-generated comments on a news page featuring a widely publicized child sexual abuse case (referred to as the Montana Case) for themes of blame. **RESULTS AND IMPLICATIONS:** The user-generated comments produced separate themes of blame, of which four were prevalent. Implications of the analysis of these themes of blame are two-fold. First, identification of inherent fallacies and public misconceptions of blame for the epidemic of child abuse are categorized. Second, self and identity are explored. The anticipated outcome is that through categorization of themes of blame, individuals who are not taking societal responsibility for educating themselves to help reverse this epidemic may find some negative identity. Through selective application of pieces of the collective identity phenomenon (Opp, 2012), the individuals may actually desire to "not belong" to these categories, which may provide catalyst for change in attitude, or at the very least, some inspiration for child sexual abuse prevention programs.

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DISCLOSURE OF DEPLOYMENT AND TRAUMA EXPERIENCES IN MILITARY COUPLES: IMPACT ON INDIVIDUAL AND RELATIONSHIP FUNCTIONING

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BACKGROUND AND PURPOSE: Although the impact of deployments has received a plethora of clinical and empirical attention focused on individual service members, limited research addresses the couple and family system effects of deployment. The current research studied the effects of disclosure of deployment experiences using a qualitative research design; to date, little research has addressed disclosure of deployment experiences and the impact on individual or relationship functioning. **METHOD:** This study was part of a larger research study of military couples, which included quantitative measures of individual and relationship functioning and qualitative interviews with soldiers and their female partners to understand the individual and systemic impact of deployment. Participants' disclosure levels were coded based on their interview descriptions of their disclosure to their spouse. The coders classified each participant into one of two groups: low disclosure (n=16) or high disclosure (n=55) groups, based on the description of their deployment experiences to their spouse reported during their interviews. **RESULTS**: In the qualitative data analysis, the high disclosure group reported better communication, support, couple resilience, and active connection. The low disclosure group reported higher trauma symptom scores than the high disclosure group. The low disclosure group also reported more conflict, stress, role strain, and intimacy problems. **CONCLUSION**: The current research addresses the negative impact of not disclosing deployment and trauma experiences may have on individual and relationship functioning in military couples.

COMMITMENT IN ROMANTIC RELATIONSHIPS

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BACKGROUND AND PURPOSE: Commitment is a vital component to the success of long term romantic relationships (Robinson & Blanton, 1993). Researchers have found that young adults recognize the importance of commitment as a critical step in personal readiness for marriage (Carroll et al., 2009). However, since 1970 there has been a 60% decline in the marriage rate in the United States (Cruz, 2013). The purpose of this study is to assess how young adults have personally developed their ideas of commitment in romantic relationships based on negative and positive examples in their life. The study is specifically interested in the resiliency displayed by those who have experienced more negative examples of commitment. **METHOD:** A short survey was created to allow participants to self evaluate their ideas and understanding of commitment in romantic relationships. This survey was administered online to participants and took about 10-15 minutes to complete. There are minimal risks associated with any type of psychological survey where participants are asked to think about and evaluate their persaonl feelings toward their family of origin and relationships they have observed throughout life. Data was collected from 393 undergraduate students. **RESULTS/FINDINGS:** An exploratory factor analysis was run and six different factors were identified. The findings supported the the hypothesis of the researchers. **CONCLUSION:** Family of origin examples of commitment whether they were positive or negative were found to be influential in the development and understandstanding of commitment in romantic relationships.

RISK FACTORS FOR SPOUSE ABUSE IN THE MILITARY: A META-ANALYSIS

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BACKROUND AND PURPOSE: Although a number of studies have examined risk factors for Intimate Partner Violence (IPV) in families of military members, a meta-analysis has not yet been conducted to determine which factors are the strongest predictors of IPV in this population. Also, gender differences have not been explored. **METHOD:** A literature search gathering published and unpublished studies from 1969 until 2012 was conducted as part of a larger meta-analysis of risk factors for IPV. Articles were selected for coding if they included the quantitative data necessary for the calculation of at least one effect size and were coded separately by two researchers. The Comprehensive Meta-Analysis Version 2 (Borenstein et al., 2008) was used for data analysis. **RESULTS:** Results revealed that psychological abuse ($r = .51$), relationship satisfaction ($r = -.23$), PTSD ($r = .22$), depression ($r = .11$) and alcohol use ($r = .09$) are risk factors for IPV perpetration. With regard to IPV victimization, psychological abuse ($r = .61$), relationship satisfaction ($r = -.25$), alcohol use ($r = .15$) and depression ($r = .27$) are significant risk factors. The poster will also explore the impact of gender on IPV. **IMPLICATIONS:** Marriage and Family Therapists (MFTs) provide important services to military families. The results will inform clinical assessment and safety planning for these families. This research may also be particularly valuable to MFTs since previous research has found that anger and violence are among the most common reasons that Veterans with a diagnosis of PTSD enter couples treatment (Sherman, Sautter, Jackson, Lyons, & Han, 2006).

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CARING FOR CAREGIVERS: A STUDY OF ONLINE SUPPORT GROUPS FOR ALZHEIMER'S CAREGIVERS

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BACKGROUND AND PURPOSE: By 2050, the number of people with Alzheimer's disease will nearly triple to 13.8 million (Alzheimer's Association, 2013). Due to inadequate health care and the practice of caring for the elderly at home, family often fills the caregiving gap (Urban Institute, 2007). Due to the challenges of caregiving, support is critical. Facebook support groups have the potential to be a powerful support tool. The purpose of this study was to examine the perceived benefits, participants' assessment of information accuracy, and the role of health literacy. Uses and gratifications (Katz, Blumler & Gurevitch, 1974) and social information processing (Walther, 1992) theories guided the analysis. **METHOD:** An online survey was administered via open Facebook groups/communities related to Alzheimer's disease. **RESULTS/FINDINGS:** Findings show that most group participants (75%) are heavy social media users. All respondents reported receiving both emotional support and information in the groups. Three-fourths of caregivers said they felt they were able to help others cope via group participation, while two-thirds said they gained knowledge. Health literacy was associated with the role played in online support groups, as those with higher perceived literacy frequently commented on other's statuses, though they did not necessarily share information about Alzheimer's. **CONCLUSION:** A majority of caregivers (72%) said information from the groups made them more confident in their caregiving role, highlighting the promise of this potential support mechanism. Understanding how people use the groups and whether health literacy influences information use and sharing will guide the development of support tools for this growing caregiving force.

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THE EFFECTS OF ENRICHMENT AND SOCIAL ISOLATION ON FLUOXETINE-INDUCED FORCED SWIM TEST BEHAVIOR IN MALE RATS

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BACKGROUND AND PURPOSE: Both the environment and the neurotransmitter serotonin can play a key role in the development of depression. An increase in escape-directed behavior in the forced swim test (FST) is indicative of an antidepressant-like state (Slattery & Cryan, 2012). The effects of differential rearing on FST performance remain unclear and inconsistent (Heritch et al. 1990; Cui et al. 2006; Brenes at al., 2009; Wongwitdetcha et al. 2006). Therefore, the current study investigated the effects of differential rearing and fluoxetine administration on FST performance. **METHOD:** Male Sprague-Dawley rats differentially reared in enriched (EC) or isolated conditions (IC) for 30 days. Following a locomotor test, rats were subjected to a 15-minute pretest followed by 3 injections of fluoxetine (10 mg/kg, i.p.) or vehicle 23.5, 5, and 1 hour(s) before the 5-minute FST. **RESULTS/FINDINGS:** Fluoxetine did not decrease immobility in either EC or IC rats compared to vehicle, suggesting that fluoxetine (10 mg/kg, i.p.) does not produce antidepressant-like effects in enriched or isolated rats. EC-vehicle and EC-fluoxetine rats exhibited more immobility than their IC counterparts. Additionally, differential rearing did not affect performance during the pretest session. **CONCLUSION:** These results suggest that a 30 day rearing period alters fluoxetine efficacy in enriched versus isolated rats. A longer rearing period may be necessary to observe rearing-induced alterations in serotonergic functioning. Furthermore, a longer rearing period may result in a protective effect of enrichment against depressive behaviors and an EC and IC divergence in the response to fluoxetine.

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A MODERATE DOSE OF AMPHETAMINE FAILS TO EVOKE FM 50 KHZ ULTRASONIC VOCALIZATIONS BUT INDUCES PSYCHOMOTOR HYPERACTIVITY

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BACKGROUND: Novelty/sensation-seeking is a predictor of drug experimentation and the transition to drug dependence. Animal models of novelty/sensation seeking have been developed to determine the neurobiological mechanisms in novelty/sensation-seeking to better understand these innate predispositions. Ultrasonic vocalizations (USV) have been used as an indicator of motivational state during different phases of drug dependence. The goal of this study was to use the novelty and USV assessments to predict experimenter-administered amphetamine (AMP) both acutely and chronically. **METHOD:** Sprague-Dawley rats were exposed to novelty/sensation-seeking assessments including: inescapable novelty, to assess the animals' response to a novel open environment; novelty place preference, to assess the animals' preference for a novel environment; and heterospecific assessments to assess the animals' USV response to rewarding stimuli. Animals were administered saline (SAL) or AMP (0.5 mg/kg; sc) for 7 exposures and locomotor activity and USV were measured. Following a two-week rest, all animals were administered a challenge dose of (AMP) (0.5 mg/kg) to test for locomotor and USV sensitization. **RESULTS:** Simultaneous regression revealed that AMP increased locomotor activity and was predicted by the inescapable novelty assessment. Acute AMP did not increase USV, but USV observed during chronic AMP exposures was predicted by the heterospecific assessment. A significant interaction was observed for chronic AMP exposures, such that the highest USV callers showed an increase in USV in response to AMP, and a decrease in USV if they received SAL. **CONCLUSION:** The results suggest these assessments can be used to predict different components of drug exposure in rodent models of addiction.

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THE ROLE OF THE NR2B SUBUNIT IN THE ACQUISITION OF FEAR IN DIFFERENTIALLY REARED RATS

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BACKGROUND AND PURPOSE: Research has historically demonstrated that enriched environments enhance learning and improve memory (Simpson & Kelly, 2011). However, some research suggests that animals reared in an isolated environment display better learning than animals reared in enriched or standard conditions when faced with an aversive stimulus (Reinhardt & Cain, 2013). Additionally, differential rearing alters glutamatergic function (Fone & Porkess, 2008) and evidence suggests that the NR2B subunit of the glutamatergic NMDA receptor is involved in the acquisition of fear (Rodrigues, Schafe, and LeDoux, 2001). To better understand the neurological mechanisms responsible for these learning differences, an NR2B antagonist was administered during the acquisition phase of Pavlovian fear conditioning. **METHOD:** Male Sprague-Dawley rats (21 days) were placed into enriched, isolated, or standard rearing environments for 30 days. They then underwent the acquisition phase, where they were presented with a tone paired with a mild footshock. Prior to each acquisition session, they received an injection of the NR2B antagonist ifenprodil (1 mg/kg) or vehicle. **RESULTS:** Isolated rats acquired fear to the CS faster than enriched rats. Interestingly, the standard housed rats acquired fear even faster than both the enriched and isolated rats. Administration of ifenprodil enhanced learning of the CS in enriched and isolated rats, compared to those that received vehicle. However, ifenprodil had no effect in the standard housed rats. **CONCLUSION:** These findings provide additional evidence that isolated rats display better learning of an aversive stimulus than enriched rats. These findings also suggest that the NR2B subunit contributes to the learning differences between differentially reared rats.

THE SEATED INACTIVITY TRIAL (S.I.T): PHYSICAL ACTIVITY OUTCOMES ASSOCIATED WITH EIGHT WEEKS OF IMPOSED SEDENTARY BEHAVIOR

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Sedentary behavior is a risk factor for chronic disease. It is unknown whether physically active people alter their activity behaviors in response to imposed sedentary time. **PURPOSE:** The objective of the study was to determine whether imposing 10 hours/week of sedentary time for 8 weeks would alter the physical activity profiles of physically active adults. **METHODS:** Participants were sixteen healthy young adults who met physical activity guidelines ($\geq$ 150 minutes moderate-vigorous physical activity per week). Eight participants were randomized to the sitting group (SIT), with 10 hours/week of imposed sedentary time for 8 weeks. The remaining participants were randomized to the control (CON) group. Physical activity was measured at baseline, 4 and 8 weeks via 7-day accelerometry. **RESULTS:** There were no significant differences ($p > 0.05$) in step counts (CON = 615.1 $\pm$ 3019.1, SIT= -1158.0 $\pm$ 3373.0) minutes of sedentary (CON = -57.0 $\pm$ 176.6, SIT = 5.3 $\pm$ 66.3), light (CON = 71.5 $\pm$ 146.0, SIT = 11.1 $\pm$ 56.2), moderate (CON = 1.1 $\pm$ 43.9, SIT = -8.1 $\pm$ 36.1) or vigorous (CON = 0.9 $\pm$ 4.3, SIT= -0.1 $\pm$ 6.0) physical activity when comparing the participants' typical weeks (baseline and week 8) and imposed sitting week (week 4). A greater proportion of SIT participants decreased their steps compared to CON during the period of imposed sedentary behavior ($\chi^2 = 10.3$, $p = 0.001$). **CONCLUSION:** Imposing 10 hours of sedentary time per week did not significantly change weekly physical activity behaviors of active adults.

CONTROLS ON BIOGENIC METHANE FORMATION IN CHEROKEE BASIN COAL BEDS, KANSAS

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BACKGROUND/PURPOSE: Unconventional natural gas reservoirs are an important part of our nation's energy future because natural gas is the cleanest fossil fuel and large unconventional reservoirs exist within the US. In many of these reservoirs, much of the gas formed and may continue to form biologically. By understanding what factors influence biogenic gas formation, therefore, we may ultimately be able to identify strategies to enhance gas formation. In this study, we examined how geochemistry influences gas formation in coalbeds within the Cherokee Basin, Kansas. **METHODS:** During November 2013, we collected water, gas, and microbe samples from 16 commercial coalbed methane wells in the Cherokee Basin. We measured specific UV absorbance, alkalinity, and the concentration of major anion and cations using standard methods. We are also testing for the presence of cells capable of using H_2, acetate, and methanol as substrates for methanogenesis using anaerobic culturing. Analysis of the chemical and isotopic composition of gas, DOC concentration, water isotopes, direct cell counts, and the composition of the microbial community will be completed soon. **RESULTS/FINDINGS:** Formation water sample pH and temperature averaged 7.0 and 19°C. The samples are Na-Cl type water with an average conductivity of 60.9 mS/cm. The alkalinity content of the samples ranged from 3.33 to 8.59. **CONCLUSIONS:** Upon completion of our analyses, we expect to find that the gas is primarily biological in origin and that formation water geochemistry and coal thermal maturity influence the composition and activity of microbial communities in the coalbeds.

EVAPORATIVE CONCENTRATION, DISSOLVED ORGANIC MATTER DEGRADATION AND SULFATE REDUCTION AS CONTROLS ON ARSENIC MOBILITY IN GROUNDWATER OF THE OKAVANGO DELTA, BOTSWANA

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BACKGROUND AND PURPOSE: The detrimental health effects of arsenic (As) contamination have motivated the study of As mobility around the globe. In arid environments with high evaporation, abiotic processes such as evapoconcentration and As desorption under alkaline pH are thought to be responsible for high As concentrations. In reducing groundwater, on the other hand, microbial iron (Fe) reductive dissolution is known to release As into solution. Microbial sulfate (SO_4^{2-}) reduction can precipitate sulfide minerals that incorporate As. The purpose of this study is to model the evapoconcentration on the accumulation of As and evaluate how microorganisms and dissolved organic matter impact As distribution along the groundwater flow path beneath the islands of the Okavango Delta. The Okavango Delta is an arid-zone wetland punctuated by tens of thousands of islands, and the reducing groundwater beneath these islands have dissolved As as high as 3ppm. **METHOD:** Groundwater quality data collected from four island transects in January 2013 was fitted to an evapoconcentration model to obtain process parameters. **RESULTS/FINDINGS:** Our analyses suggest that evapoconcentration and microbial Fe reduction controls As release and solute accumulation in all islands while SO_4^{2-} reduction sequesters As in all islands. DNA sequences collected grouped within lineages that contain organisms capable of dissimilatory Fe and SO_4^{2-} reduction, including *Geobacteracea* and *Desulfovibrionaceae*. **CONCLUSION:** Coupled abiotic-biotic processes and DOM transformations have a fundamental role in As mobility in arid and reducing groundwater. Our findings have important implications to evaluate microbial SO_4^{2-}-reduction as a promising inexpensive remedial method for As contamination and its limitations.

FLUE GAS DESULFURIZATION WASTEWATER TREATMENT USING CONSTRUCTED WETLANDS

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BACKGROUND AND PURPOSE: Coal-fired power plants emit harmful pollutants such as sulfur dioxide, nitrogen oxides, and carbon dioxides. To combat these harmful emissions the Clean Air Act was established in 1970. To comply with these federal regulations, coal-fired power plants implemented Flue Gas Desulfurization (FGD) to reduce sulfur dioxide emissions. Although FGD systems reduce atmospheric emissions they create wastewater containing harmful pollutants such as selenium, arsenic, and mercury. Constructed wetlands are increasingly being employed for the removal of these toxic trace elements from FGD wastewater. This study investigates constructed wetland's native microbes' dependency on organic carbon and the competitive interactions between selenium and arsenic in column experiments that simulate FGD wastewater treatment by constructed wetlands. Laboratory column outflow experiments using soils with natural FGD wastewater are underway. **ANTICIPATED RESULTS:** It is anticipated native microbes will be capable of treatment but require a carbon source and the competitive interactions between selenium and arsenic will rapidly fill sorption sites that may lead to a shorter treatment cell life. **CONCLUSION:** FGD technology has great potential for reducing harmful air pollutants from being emitted. Now the challenge remains to design treatment systems for the sequestration of toxic trace elements that are released in the FGD wastewater stream. Therefore our evaluation of the sustainability and most effective process parameters of constructed wetland systems is important for power providers.

ENVIRONMENTAL IMPACT OF BIOFUELS PRODUCTION: THE CASE OF NORTHEAST, WEST CENTRAL AND CENTRAL KANSAS AGRICULTURAL DISTRICTS

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BACKGROUND AND PURPOSE: Degraded water quality issues in the Kansas River are dominated by intensive cultivation of crops, and subsequent nutrient enrichment and erosion. The current condition can be further aggravated with increasing biofuel demand in Midwest Corn Belt region. This could impair the suitability of water for aquatic life and has the potential for impairing the water's suitability for human use. The study of the Kansas River sub- basins, located in northeast, west central and central Kansas agricultural districts, is used to assess the difference in environmental impacts of biofuel production. The selected study areas have a shift in dominant crop type from corn to wheat mainly due to semi-arid climate and limited irrigation in western part. **METHOD:** The calibrated SWAT hydrological/water quality model is being used to simulate bioenergy scenarios, assuming the expansion of biofuel crops into available pasture and/or grassland and shift in dominant crop type. **RESULTS/FINDINGS:** Initial results indicate that increasing corn acreage by replacing available agricultural, pasture and grassland increases nitrate and sediment losses more in Northeast than West-Central or Central Kansas agricultural districts. This may be due to dominant agricultural land-use (63.7%), moderately-high to high runoff potential soil ($\approx$77%) in the Perry watershed. Spatial differences in precipitation and evapotranspiration could also explain the differences. Degraded water quality issues reported for Perry Lake could be further aggravated with increasing biofuel demand in the Midwest Corn Belt region.

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WATERSHED DELINEATION AND PAIRED WATERSHED SELECTION: FORT RILEY MILITARY INSTALLATION, KANSAS

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BACKGROUND AND PURPOSE: Paired watershed design has been used to study the impact of land use change in hydrology. It is based on two very similar watersheds; and their similarity leads to the belief that both watersheds will respond similarly to the climatic forcing. This study focuses on how to select paired watersheds to study the land use changes impact on hydrological processes. The objective is to develop a technique and select statistically justifiable paired watersheds. **STUDY AREA:** The study area, Fort Riley Military Installation, is located in northeastern Kansas and covers about 411 km^2. About 72% of the land area (i.e. 295 km2) has been used for maneuver training since the 1950s. The substantial changes in the landscape condition and physiochemical properties of soil due to these military activities have also been reported by studies. However, these hydrologic responses have not been studied yet. **METHOD:** Eight topographic variables were used as inputs into a paired watershed analysis. The dataset was standardized using the zscore function to alleviate the domination of one or more variable/s in the clustering process. The K-means and hierarchical-agglomerative clustering techniques were used to classify similar watersheds. **RESULTS AND CONCLUSION:** The analysis showed that 6 clusters are the optimum classification with a maximum Silhouette value of 0.42; in addition, the watersheds in each cluster are paired with the cophenetic correlation coefficient that ranges from 0.816 to 0.934. This study provides a mechanism to process paired watershed selection in order to determine in a scientific way.

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INCORPORATION OF SWEET SORGHUM JUICE INTO CURRENT DRY-GRIND ETHANOL PROCESS FOR IMPROVED ETHANOL YIELDS, ENERGY SAVING AND WATER EFFICIENCY

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BACKGROUND AND PURPOSE: Sweet sorghum is a potential energy crop. The plant juice has high concentration of fermentable sugars (sucrose, glucose, and fructose) of approximately 16-18%. Sorghum has a high biomass yield (20-30 dry tons/hector), and is highly adaptable to diverse climate and soil conditions. Currently, a year-around ethanol production based on sweet sorghum is difficult to achieve due to instability of supply. One possible way to solve this challenge is to incorporate sweet sorghum juice into current dry-grind ethanol process. The goal of this research is to develop a new processing technology for current ethanol industry using sweet sorghum for ethanol production. In this study, the optimum grain sorghum flour loading with sweet sorghum juice that will produce highest fermentation efficiency and ethanol yield within the shortest enzymatic hydrolysis time is determined. The fermentation performance of sweet sorghum juice with grain flour using raw starch hydrolyzing enzyme is, as well, investigated. **METHOD:** Ethanol fermentation by *Saccharomyces cerevisiae* were performed on 6 different slurries which contained varying quantities of grain sorghum flour (0 g, 6 g, 9 g, 12 g, and 15 g) added to a 100 ml of sweet sorghum juice and a 30 g sorghum db flour with 100 mL distilled water, as control. **RESULTS AND CONCLUSION:** The primary results revealed that grain sorghum flour loading was 15 g added to 100 ml of sweet sorghum juice produced the highest ethanol yield of 16.74 v/v%. The optimum enzymatic hydrolysis time was 30 minutes – energy conserved.

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GREENHOUSE GAS FOOTPRINTS OF TWO NON-LEGUME COVER CROPS FOLLOWING WINTER WHEAT

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Agriculture practices can affect the production of greenhouse gas emissions. **BACKGROUND:** Conflicting studies on the ability of cover crops to alter carbon and nitrogen (N) storage, reduce nitrogen losses and improve crop yields necessitate further study. One understudied loss mechanism is gasses losses of carbon and nitrogen. The objective of this study was to measure CO_2, N_2O, and CH_4 gas emissions from summer and winter non-legume cover crop and chemical fallow treatments planted after wheat. **METHODS:** Field plots where established in 2007 at the Kansas State University Experiment Station in Riley County, Kansas to examine the use of different cover crops in a Soybean -Wheat/Cover Crop-Sorghum rotation, with a range of nitrogen fertilizer application rates applied at sorghum planting. Gas flux measurements were measured weekly from polyvinyl chloride (PVC) chambers constructed according to USDA-ARS GRACEnet Project Protocols. Two PVC rings 30-cm diameter 15 tall were installed in each plot to a depth of 10-cm, and used to support soil chambers during measurements. Flux measurements were taken by placing vented chambers on rings and collecting samples at 0, 15, 30, 45 min. Linear regression techniques were used to determine flux rates for each chamber and average flux rates for each treatment were used to calculate total season fluxes. I do not have **RESULTS** and **CONCLUSIONS** at this time.

Relevance of Research to State-Related Topic(s)

The implication of greenhouse gas research in Kansas is important for not only environmental quality issues, but for proper and efficient use of fertilizers in Kansas cropping systems. Kansas is well known for its large amounts of farm land, understanding the amount of greenhouse gas emission from these lands will allow Kansans to improve agriculture practices to sustain the environment for future use. Cropping rotations that include cover crops are becoming more popular on Kansas farms. This research will help to discover how cover crops are affecting the agro-ecosystem in Kansas; and what these changes mean for the environment and for fertilizer efficiency.

A META-ANALYSIS OF RELATIONSHIP FACTORS IMPACTING COUPLES WITH IPV

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BACKGROUND AND PURPOSE: Intimate Partner Violence (IPV) is a major public health concern affecting millions of families in the United States each year. Research has focused on gaining a greater understanding of risk factors associated with IPV. A meta-analysis was conducted to identify the relationship factors that counselors should target in working with couples experiencing IPV. This presentation will focus on attachment characteristics, jealousy, and communication skills. **METHOD:** Computer database searches were the primary method utilized for identifying articles for inclusion in the study. Over 460 articles were included in a larger meta-analysis, of which this poster proposal is a part. Effect sizes were entered and analyzed using Comprehensive Meta-Analysis Version 2 (Borenstein et al., 2008). **RESULTS/FINDINGS:** Preliminary analyses indicated that jealousy ($r = .36$) is the strongest risk factor and dismissive $-$ avoidant attachment style ($r = .002$) is the weakest risk factor for IPV. However, other factors examined varied in their strength, negative relationship communication ($r = .28$), and anxious-pre-occupied attachment style ($r = .16$). The poster will also address gender differences, for example, anxious-preoccupied attachment is a significant predictor of female perpetration ($r = .34$), but not of male perpetration ($r = .09$). **IMPLICATIONS:** Preliminary findings suggest that attending to issues of attachment, helping clients build trusting relationships, improving communication skills, and increasing overall relationship satisfaction can be important factors in preventing and/or reducing IPV in relationships.

Relevance of Research to State-Related Topic(s)

In the state of Kansas from 2009-2011, there were 71,851 reported incidents of domestic violence (24,459 in 2011 alone) with a 40,256 incidents of domestic violence that resulted in an arrest (13,478 in 2011) (Kansas Bureau of Investigation, 2013). Thus, IPV is a pervasive social problem that has devastating effects on family members and the larger Kansas community. In addition, studies have shown that there is a similar IPV prevalence rate between military and civilian populations and there is a large presence of military personnel and their families in the K-State student body and surrounding community. Thus findings from this research can have an impact on how mental health professionals support civilian and military families dealing with IPV.

ENCOURAGING THE ADOPTION OF *E. COLI* CONTROL AND PREVENTION STRATEGIES: ANALYSIS OF AN ONLINE TRAINING INTERVENTION

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BACKGROUND AND PURPOSE: This study explores the effectiveness of health communication strategies in the control and prevention of foodborne diseases. The theory of planned behavior is utilized to analyze an online video training intervention by identifying individual attitudes, norms, perceived behavioral control and intentions of adopting management strategies for *E. coli* among beef cattle producers (n=60). **METHOD:** An online questionnaire was used to measure pre-video attitudes, norms, perceived behavior control and intentions regarding *E. coli* in the beef industry before allowing participants to watch an *E. coli* management training video. Next, the questionnaire measured perspectives on the video's content, favored sources for receiving educational information, as well as post-video attitudes, norms, perceived behavior control and intentions. **RESULTS/FINDINGS:** The results showed significant positive changes in respondents' perceptions on *E. coli* and the advocated prevention strategies after viewing the video. Although most of them had not used previously used online training, they found the information disseminated easy to understand. Also, results demonstrated that while beef cattle producers primarily rely on periodicals or veterinarians for management information, many of them identified online sources as the preferred method to receive prevention-related training. **CONCLUSION:** Based on the findings of this study online training is an appropriate tool for encouraging the adoption of *E. coli* control strategies among beef cattle producers. The findings also suggest that there is an unmet demand for online training. Further research is, however, is needed to identify the barriers to using online training including accessibility as well as individual characteristics such as level of knowledge and self-efficacy.

Relevance of Research to State-Related Topic(s)

Since Kansas is one of the most important cattle-producing states in the country, conducting research related to issues involving cattle production is important to the state. One important public health and economic concern for beef producers and consumers is *E. Coli* 0157:H7 contamination. It is important to encourage the adoption of pre-harvest *E. coli* control and prevention strategies to help control this contamination through strategic communication with cattle producers. With the advances in technology, online health communication strategies can effectively provide this education. This study provides preliminary evidence demonstrating the potential effectiveness and validity of using online training to encourage the adoption of *E. coli* control and prevention strategies. Adoption of such strategies within a cattle production ranches can have an impact on public health and ensure that the industry will deliver healthy a healthy, quality product.

A NONLINEAR CONTROL SCHEME FOR EXTREMUM POWER SEEKING IN WIND TURBINE ENERGY CONVERSION SYSTEMS

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BACKGROUND AND PURPOSE: an adaptive control scheme for wind turbine systems has been developed. The role of the controller is to adaptively reach the maximum estimated power coefficient when the wind speed changes. The contribution of this work is that instead of using the dither signal used in previous works, the extremum seeking controller uses fluctuations in wind speed to adaptively maximize the output power. **METHOD:** In the proposed control scheme, the wind turbine power coefficient is estimated using a Lyapanov-based adaptive control technique. The estimated power coefficient is used to determine a desired turbine rotor speed based on an estimate of the power coefficient gradient with respect to rotor speed. **RESULTS/FINDINGS:** This control system was developed in a Matlab/Simulink environment, which simulates dynamics of the system from the turbine rotor (using NREL 5MW FAST model), where the kinetic wind energy is converted to mechanical energy, to the generator, which transforms mechanical power to electrical power. The two main control schemes, i.e. power coefficient estimation with rotor speed regulation and desired rotor speed calculation based on maximizing the estimated power coefficient, have shown robust dynamic behaviors. **CONCLUSION:** The NREL FAST numerical results demonstrated the validity and robustness of the developed control scheme.

Relevance of Research to State-Related Topic(s)

Wind is a cost-effective, clean renewable energy that can benefit Kansas future energy needs. Although the Kansas receives only a small percentage of electrical energy from wind, increasing total wind power capacity in the state will be very helpful. This desired growth in wind energy provides motivation to conduct many engineering investigations to improve efficiency and productivity of these systems. However, one technical challenge is to develop a robust control scheme for maximum power seeking in wind turbines in the presence of wind speed fluctuations. So this research relates to alternative energy sources in the state of Kansas.

GROWTH OF HBN USING METALLIC BORON: ISOTOPICALLY ENRICHED [10]BN FOR NEUTRON DETECTION

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BACKGROUND AND PURPOSE: Due to the increasing scarcity of ^{3}He for gas detectors there is a growing need for a highly sensitive neutron detector with high gamma radiation discrimination. Hexagonal boron nitride (hBN) has recently shown promise as a solid-state neutron detector due to the development of a growth technique for bulk hBN single crystals[1] using a Ni-Cr solvent. **METHOD:** Our research modified this technique to allow for the growth hBN single crystals from metallic boron sources. Crystals were precipitated through cooling of a molten metal solution composed of Ni, Cr and B under nitrogen flow at high temperatures and atmospheric pressures. This process facilitates the growth of hBN from enriched ^{10}B and ^{11}B sources. ^{10}B enrichment of hBN detectors should improve neutron capture efficiency up to a factor of five thereby decreasing the hBN single crystal thickness needed to produce a full neutron interaction spectrum. **RESULTS:** Crystals grown using this process were extracted from the metal surface using a thermal release tape exfoliation technique. This technique produced free crystal layers which could then be employed as free-standing crystals or transferred onto an arbitrary substrate. Confirmation of isotopically pure hBN was tested by shifts in the Raman spectra peak. Metal contacts were deposited onto the surface of crystals to allow for electrical characterization and neutron response measurements. Finally, enriched h(^{10}B)N and h(^{11}B)N crystals were tested under neutron flux and compared to previously measured spectra produced by natural hBN to confirm the benefits of isotopic enrichment.

Relevance of Research to State-Related Topic(s)

This research is relevant, both on a state and federal level, due to the need for nuclear security and deterrment. 3He, the isotope currently used by the DHS for port-side detection of nuclear weapons material, has recently grown short in supply due to reduction of nuclear weapons production. Due to this shortage, new neutron-detection materials must be developed to ensure that these weapons materials can be detected and prevented from being brought into the country. Development of new radiation-detection materials, such as hBN, ensures the U.S.'s ability to detect nuclear weapons material and enforce nuclear non-proliferation agreements. Additionally, hBN shows potential to be able to be developed into a portable, hand-held detector, allowing for more flexibility than traditional gas detectors.

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[1] Kubota, et al. *Chemistry of Materials* **2008**, 20, 1661-1663.

TRANSFER BOND TEST USED TO PREDICT TRANSFER LENGTH OF CONCRETE RAILROAD TIES

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BACKGROUND AND PURPOSE: A study was conducted at Kansas State University to determine the correlation between tensioned-wire pullout tests and the corresponding transfer lengths in prestressed concrete railroad ties. Five different 5.32-mm-diameter pre-stressing wires were selected to be used on this project based on previous testing conducted at Kansas State University (KSU). The wires were tested to simulate the transfer-length bond. **METHOD:** The transfer-length bond test involved tensioning each of the wires to 75% of their ultimate capacity, casting concrete around each wire and then de-tensioning the wire when the concrete had reached 4,500 psi. End-slip and force measurements were recorded on both sides of the specimen as the wire was de-tensioned. **RESULTS/FINDINGS:** Transfer bond data was used to investigate the transfer length that each wire type would expect to see in a concrete railroad tie. Prisms with each wire type were cast and the transfer length was measured for each type of wire. **CONCLUSION:** Prism end-slip measurements were used along with the transfer bond data to correlate a relation between the transfer bond test and the transfer lengths of the prisms.

Relevance of Research to State-Related Topic(s)

This research progect deals with the use of prestress wire in concrete railroad ties. The use of concrete tie is important to the enviroment and to the public since the concrete ties last longer and are more durable than wooden ties. The study of the behavior of the concrete tie reinforcements is crucial to be able to better understand the nature of the reinforcement.

VALIDATION OF WASHING TREATMENTS TO REDUCE PATHOGENS IN FRESH PRODUCE

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BACKGROUND AND PURPOSE: Many fresh produce outbreaks are the result of *Salmonella* and *Escherichia coli* O157:H7 contamination due to growing conditions or human handling. The purpose of this study was to determine the efficacy of a commercial wash solution for reducing pathogens in green leaf lettuce and tomatoes. **MATERIALS AND METHODS**: Lettuce (25 ± 0.3g) and tomato samples were inoculated with *E. coli* O157:H7 (~7.8 log CFU/ml) and *Salmonella* spp. (~9.39 log CFU/ml), respectively. Inoculated samples were washed separately with commercial wash solution (contains citric acid and grapefruit oil) or tap water (control) for three contact times (30, 60, and 120 s). Lettuce (25 ± 0.3g) and tomato (core of 11.34 cm^2) samples were diluted and stomached for 1 min and then 0.1 ml was plated onto CT-SMAC and XLD agar plates for *E. coli* O157:H7 and *Salmonella* recovery. Experiment consisted of three replications and two samples per treatment (n=6). **RESULTS AND CONCLUSION**: Recovery of *E. coli* O157:H7 populations on leaf lettuce were different ($P<0.05$) between commercial wash solution and cold tap water. There were no differences ($P>0.05$) between commercial wash and tap water in *Salmonella* populations recovered from tomatoes samples. Commercial wash solution reduced *E. coli* O157:H7 populations by 3.0 logs on leaf lettuce and *Salmonella* populations by >2.0 logs on tomatoes for all contact times. The commercial wash solution is applicable for food service and home-use and would reduce risk of pathogens on produce.

Relevance of Research to State-Related Topic(s)

Fresh produce, such as tomatoes and lettuce have repeatedly been associated with foodborne outbreaks connected to *Escherichia coli* O157:H7 and various *Salmonella* serovars. Usually fresh produce is exposed to minimal processing in order to maintain organoleptic characteristics, which increases the potential risk of contamination. The aim of this research was to determine the efficacy of a tap water and a commercial wash solution for reducing pathogens on the surface of green leaf lettuce and tomatoes to develop recommendations for school food service personnel on best practices for washing fresh produce. Overall, these findings provide insights in how to improve the washing process of fresh produce in the food service systems in Kansas.

A FOUR PLEX REAL-TIME PCR ASSAY FOR THE DETECTION AND QUANTIFICATION OF *Escherichia Coli* O157 IN CATTLE FECES

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BACKGROUND AND PURPOSE: Cattle are asymptomatic reservoirs for Shiga toxin-producing *Escherichia coli* O157:H7, a major food borne pathogen. Typically, the organism colonizes the hindgut and is shed in the feces, which serves as a source of contamination of food products. Culture-based detection and quantification methods have been low-throughput and time-consuming. The objective was to develop a multiplex, real-time quantitative PCR (mqPCR) assay for the detection and quantification of *E. coli* O157 in cattle feces based on genes that code for the serogroup specific O157 antigen (*rfbE* O157) and three major virulence factors, Shiga toxins 1 and 2 (*stx*1 *and stx*2) and intimin (*eae*). **METHOD:** Primer and probe concentrations were optimized with extracted DNA from a strain of O157 (ATCC 43894) containing all four genes. Sensitivity of the assay was determined with extracted DNA from serial ten-fold dilutions of *E. coli* O157 ATCC 43894 cultured. **RESULTS/FINDINGS:** In pure culture, the minimum detection limit of the assay was 3.1×10^3 CFU/mL. Serial dilutions of pure cultures of *E. coli* O157 strains (ATCC43889 and ATCC 43894) spiked in cattle feces were prepared to determine applicability of the assay to quantify the organism. Sensitivity of the mqPCR assay from spiked fecal samples was determined. **CONCLUSION:** The detection limit of the mqPCR assay for *E. coli* O157 (ATCC 43894) with DNA extracted directly from cattle feces was 7.8×10^4 CFU/g. However, after six-hour enrichment, sensitivity increased to 3.3×10^0 CFU/g. The assay targeting the four genes has the potential to be a high-throughput method for detecting and quantifying *E. coli* O157 in cattle feces.

Relevance of Research to State-Related Topic(s)

As recent as July of this year, a Kansas beef packing company initiated a recall of more than fifty-thousand pounds of ground beef that had shipped nationwide. The source of the recall was *E.* coli O157 contamination, which remains a potentially deadly food-borne pathogen. Any such disruption to the safety of Kansas beef can have devastating state-wide consequences on the entire beef industry. It is the goal of our research to create an efficient and high-throughput method for detecting *E.* coli O157 at the feedlot level, before it has the opportunity to contaminate the beef supply. Our mqPCR would have the ability to screen for the pathogen in cattle feces, allowing for early detection within the beef chain and ensuring the safety of beef consumers.

IMPACT OF NITROGEN RATE ON NITROUS OXIDE EMISSIONS AND LIFE CYCLE GREENHOUSE GAS EMISSIONS IN SWITCHGRASS-BASED CELLULOSIC ETHANOL

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BACKGROUND AND PURPOSE: The 2007 Energy Independence Security Act mandates the production of 16 billion gallons per year of cellulosic biofuel by 2022. These biofuels will be required to have life cycle assessment (LCA) greenhouse gas (GHG) emissions 60% below gasoline. Switchgrass is one potential feedstock for the production of cellulosic ethanol. Emissions of the GHG nitrous oxide (N_2O) from soils treated with nitrogen fertilizer could negatively impact the GHG balance of biofuels. The objectives of this study were to 1) measure the yield and N_2O emissions from switchgrass receiving different rates of N fertilizer and 2) determine the impact of these emissions on the LCA GHG emissions of switchgrass-based ethanol. **METHOD:** Annual N_2O emissions were measured from switchgrass receiving different N rates. Measured yields and N_2O emissions were used as inputs in the GREET LCA model to simulate the life cycle GHG emissions of switchgrass-based ethanol. **RESULTS/FINDINGS:** Nitrogen rate increased switchgrass biomass by an average of 20 kg / ha per kg N applied. Increasing nitrogen rate caused substantial increases in the LCA GHG emissions of switchgrass-based cellulosic ethanol. Much of the increase was due to increased N_2O emissions, which accounted for 58% of total LCA GHG emissions in switchgrass receiving 150 kg N / ha. LCA GHG emissions of ethanol were lower than emissions from gasoline at all N rates. **CONCLUSION:** Increased N rates increased yield but also substantially increased the GHG balance of switchgrass-based ethanol. Optimal N management will be key in maximizing GHG savings from the use of switchgrass for cellulosic ethanol production.

Relevance of Research to State-Related Topic(s)

To help meet the mandates in the 2007 Energy Security Act, the Department of Energy is contributing funding to the construction of several cellulosic ethanol plants throughout the United States, including the Abengoa Bioenergy Plant in Hugoton, Kansas. Farmers who sign contracts to provide biomass to cellulosic plants will be looking at growing a variety of crops, including switchgrass, to fulfill their contracts. However, nitrous oxide emissions from soils planted in switchgrass could impact the effectiveness switchgrass-based cellulosic ethanol in mitigating GHG emissions. This study aims to measure nitrous oxide emissions from soils grown in switchgrass receiving different rates of nitrogen fertilizer. These measurements will be essential for developing accurate estimations of GHG emissions from switchgrass in Central Kansas and provide information to farmers about optimal nitrogen management in switchgrass grown for bioenergy production.

STUDY OF THE FEASIBILITY OF USING COMBINED GLASS PARTICLE SIZES AND TYPES IN CONCRETE AS PARTIAL CEMENT REPLACEMENT

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BACKGROUND AND PURPOSE: Finely ground glass has the potential of pozzolanic reactivity, and can serve as a supplementary cementitious material (SCM). The uniform composition, amorphous nature, and high silica content of glass make it ideal for studying effects of glass type and particle size on reactivity at different temperatures. This study focuses on determining how combining glass types and particle sizes affects the microstructure and performance properties of cementitious systems containing glass cullet as a SCM. **METHOD:** In this study, the reaction rate, pozzolanicity, and hydration degree quantification of four sets of combined glass types and sizes have been investigated using isothermal calorimetry, thermogravimetric analysis (TGA), and analysis of scanning electron microscope (SEM) images. Moreover, compressive strength tests were performed to correlate reactivity of cementitious materials containing glass to its performance. **RESULTS/FINDINGS:** The results show that combined glass can increase reaction rate and have pozzolanic properties, especially when particles below 25μm of clear and green glass were used at curing teperature of 50°C. Additionally, at elevated curing temperatures the combined glass was able to increase the compressive strength of the mortar samples. **CONCLUSION:** Glass cullet is a very temperature-sensitive supplementary cementitious material. Additionally, glass pozzolanic reactivity is a linear function of surface area, reflecting that the surface area would be a significant factor affecting glass cullet reactivity. Combined glass cullet, especially glass below 25μm in diameter, can be used as an effective SCM.

<u>Relevance of Research to State-Related Topic(s)</u>

Concrete pavements are very common in road construction in the State of Kansas. They are expensive, largely due to the cost of raw materials and labor both in construction and maintenance. Additionally, cement production releases large amounts of CO_2 gas, leading to more environmentally detrimental impacts, i.e. Global Warming. The current study investigates glass cullet performance in concrete as supplementary cementitious materials (SCMs). The project is based on laboratory activities and microstructural studies, and is trying to quantify the behavior of combined glass cullet types and sizes in concrete, as well as study their effects on concrete strength and durability. Using glass cullet as a SCM in concrete pavements decreases the amount of cement needed, which results in lower pavement costs. Using less cement also reduces the environmentally harmful effects of cement production.

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