

**K-State Graduate
Research, Arts, and Discovery (GRAD)
Forum**

Program Booklet

Wednesday, March 30, 2016
Engineering Complex

Sponsored by:
Graduate Student Council
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PROGRAM SCHEDULE

Morning Oral Presentations

8:45 – 11:25	Engineering/Math/Physical Sciences 1	1044 Rathbone
8:45 – 10:15	Social Sciences/Humanities/Education 1	CIS Conference Room
9:00 – 11:10	Agricultural Sciences 1	ECE Conference Room
9:30 – 12:10	Interdisciplinary Research	2064 Rathbone
9:30 – 11:40	Social Sciences/Humanities/Education 2	1094 Fiedler

Afternoon Oral Presentations

12:45 – 2:30	Agricultural Sciences 2	ECE Conference Room
12:45 – 3:25	Engineering/Math/Physical Sciences 2	1044 Rathbone
1:00 – 2:45	Social Sciences/Humanities/Education 3	1094 Fiedler
1:15 – 3:25	Biological Sciences	2064 Rathbone

Poster Sessions

9:30 – 5:00	Posters on display	Engineering Atrium
10:00 – Noon	Poster Judging Agricultural Sciences 1 Biological Sciences Engineering/Math/Physical Sciences 1 Engineering/Math/Physical Sciences 2	
1:30 – 3:30	Poster Judging Agricultural Sciences 2 Interdisciplinary Social Sciences/Humanities/Education	

Awards Ceremony

4:30	Engineering Hall (DUE 1109)
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*The awards ceremony will include a special presentation from Matt Garcia, assistant professor in Department of Art, and April Bojorquez, instructor in Department of American Ethnic Studies and assistant curator at the Marianna Kistler Beach Museum.

Oral Session Schedules

Engineering/Math/Physical Sciences 1

1044 Rathbone

8:45AM – 11:25AM

8:45 **DEVELOPMENT OF NEW SAFETY PERFORMANCE FUNCTIONS FOR RURAL FOUR-LANE DIVIDED SEGMENTS IN KANSAS**

Syeda Rubaiyat Aziz

9:00 **AN ADAPTIVE SINUSOIDAL PULSE WIDTH MODULATION TECHNIQUE FOR CASCADED MULTILEVEL CONVERTERS**

Jacob Lamb

9:15 **FE₃O₄-GRAPHENE ANODE MATERIALS WITH IMPROVED CYCLING PERFORMANCE FOR LI-ION BATTERIES**

Huan Wang

9:30 **EPITAXY OF BORON PHOSPHIDE ON ALUMINUM NITRIDE(0001)/SAPPHIRE SUBSTRATE**

Balabalaji Padavala

9:45 **SENSITIVITY OF MICROWAVE ABLATION MODELS TO TISSUE BIOPHYSICAL PROPERTIES: A FIRST STEP TOWARDS PROBABILISTIC MODELLING AND TREATMENT PLANNING**

Jan Sebek

BREAK

10:10 **DEGRADATION OF GRAPHITE DUE TO AIR INGRESS AT HIGH TEMPERATURES**

Dan Gould

10:25 **MODELING AND STABILITY ANALYSIS OF GRID-INTERACTIVE VOLTAGE SOURCE INVERTER (VSI)**

Aswad Adib

10:40 **A FIRST-PRINCIPLES INVESTIGATION OF HEXAGONAL BORON NITRIDE GROWTH ON NICKEL SURFACES**

Song Liu

10:55 **MAGNETIC RESONANCE THERMOMETRY GUIDANCE FOR PRE-CLINICAL HYPERTHERMIA EXPERIMENTS IN SMALL-ANIMALS**

Pegah Faridi

11:10 **REPEATABILITY AND SENSITIVITY ANALYSIS OF THE BANCS MODEL DEVELOPED TO PREDICT ANNUAL STREAMBANK EROSION RATES**

Kari A. Bigham

Social Sciences/Humanities/Education 1

CIS Conference Room

8:45AM – 10:15AM

- 8:45 **“SHUT IT DOWN!?”: NEGOTIATING POST-FEMINIST WORK/LIFE IN *30 ROCK***
Katrina N. Hanna
- 9:00 **THE EFFICACY OF TARGETED VS NONTARGETED TACTICS IN WAR TERMINATION**
Alyssa Jackson
- 9:15 **YOUR ENVIRONMENT AND YOU: INVESTIGATING STRESS TRIGGERS AND CHARACTERISTICS OF THE BUILT ENVIRONMENT**
Parker Ruskamp
- 9:30 **SPEAKING OUT: TRANSACTING THE SILENCE IN *SPEAK* AND AMERICAN RAPE CULTURE**
Domeniqué N. Bernett
- 9:45 **THE VIOLENCE, CRIME, AND ODDITIES OF JUNCTION CITY, KANSAS AND HOW IT RELATES TO THE DEVELOPMENT OF *TOOFLADY***
Thea Meussling
- 10:00 **IMPOSTER SYNDROME: SOCIAL IDENTITY CONSTRUCTION OF FIRST-GENERATION STUDENTS AT A FOUR-YEAR UNIVERSITY**
Miranda B. Klugesherz

Agricultural Sciences 1

ECE Conference Room

9:00AM – 11:10AM

- 9:00 **GLOBAL POTENTIAL OF ETHANOL INDUSTRY CO-PRODUCT: DISTILLERS DRIED GRAINS WITH SOLUBLES (DDGS) AS A DIETARY SUPPLEMENT**
Rajesh Kumar
- 9:15 **EFFECTS OF FEEDING MICROALGAE MEAL (*SCHIZOCHYTRIUM LIMACINUM* CCAP 4087/2) TO BEEF HEIFERS ON FRESH MEAT QUALITY**
Kelsey J. Phelps
- 9:30 **INVESTIGATION OF SOLUBLE AND INSOLUBLE FIBERS FOR PHYSICOCHEMICAL, RHEOLOGICAL AND THERMOMECHANICAL PROPERTIES**
Chetan Sharma
- 9:45 **ASSESSMENT OF HESSIAN FLY, *MAYETIOLA DESTRUCTOR* (DIPTERA: CECIDOMYIIDAE), ATTRACTION TO VISUAL AND OLFACTORY CUES IN Y-TUBE OLFACTOMETERS**
Ryan B. Schmid

BREAK

- 10:10 **DETERMINATION OF THE EFFECT OF BRAND AND PRODUCT IDENTIFICATION ON CONSUMER PALATABILITY RATINGS OF GROUND BEEF PATTIES**
Alaena Wilfong
- 10:25 **EFFECT OF METHOPRENE IMPREGNATED POLYMER PACKAGING ON THE DEVELOPMENT OF *TRIBOLIUM CASTANEUM* AND *TROGODERMA VERIBILE***
Deanna Scheff
- 10:40 **ENHANCEMENT EFFECTS ON CONSUMER ACCEPTABILITY OF BEEF STRIP LOIN STEAKS**
Kassandra McKillip
- 10:55 **USING SEALED BINS TO ENSURE SUCCESSFUL GRAIN FUMIGATIONS**
Sam Cook

Interdisciplinary Research

2064 Rathbone

9:30AM – 12:10PM

9:30 **STUDENTS' WRITTEN SOLUTIONS REFLECT VARIED SOLUTION SCHEMATA**

Nandana Weliveriya

9:45 **A NOVEL APPROACH TO CONVERT METALLIC SILVER DIRECTLY INTO SILVER NANOPARTICLES**

Asanka S. Yapa

10:00 **ALGORITHMIC, CONCEPTUAL, PHYSICAL THINKING AND PHYSICAL MATH: A FRAMEWORK FOR UNDERSTANDING STUDENT DIFFICULTIES IN QUANTUM MECHANICS**

Bahar Modir

10:15 **DEVELOP LIGNIN-PROTEIN BASED ADHESIVE**

Sarocho Pradyawong

10:30 **ANTIMICROBIAL RESISTANCE IN DIRECT-FED MICROBIALS USED IN CATTLE**

Felicia Giok

BREAK

10:55 **MICROBIAL LIPID PRODUCTION FROM LIGNOCELLULOSIC BIOMASS USING ROBUST OLEAGINOUS YEASTS**

Jungeun Lee

11:10 **SPATIO-TEMPORAL DYNAMICS OF JUNIPER ENCROACHMENT IN OAK WOODLANDS**

Pabodha Galgamuwa G.A.

11:25 **CHARACTERIZATION AND MECHANISTIC INVESTIGATION OF DYE DECOLORIZING PEROXIDASE (DYP) FROM THERMOMONOSPORA CURVATA AND ENTEROBACTER LIGNOLYTICUS**

Ruben Shrestha

11:40 **THE IMPACT OF OIL COMPOSITION ON EMULSION FORMATION AND STABILITY**

Yulia Burakova

11:55 **STRUCTURES OF PEPTIDE NANOVESICLES FOR CANCER THERAPY**

Nilusha Kariyawasam

Social Sciences/Humanities/Education 2

1094 Fiedler

9:30AM – 11:40AM

9:30 **HOUSEHOLD FOOD INSECURITY ACCESS PREVALENCE (HFIAP) AS PREDICTOR OF STUNTED CHILD AND OVERWEIGHT/OBESE MOTHER (SCOWT) IN URBAN INDONESIA**

Trias Mahmudiono

9:45 **PERCEPTIONS OF RACISM IN THE CONTEXT OF POLICE SHOOTINGS: MISSES OR FALSE-ALARMS IN OBSERVERS' ATTRIBUTIONS TO PREJUDICE?**

Stuart S. Miller

10:00 **FAMILY SEXUAL COMMUNICATION AND SEXUAL ATTITUDES: UNDERSTANDING THE INFLUENCE ON COUPLES' SEXUAL COMMUNICATION**

Allen Mallory

10:15 **RELATIONSHIP FACTORS INFLUENCING DOCTORAL STUDENT RETENTION AND SUCCESS: AN EXPLORATORY STUDY OF FACULTY ADVISOR AND DOCTORAL STUDENT**

Amanda J. Fairbanks

BREAK

10:40 **BEYOND THE TRADITIONAL: AN EXAMINATION OF THE MULTIPLE MANIFESTATIONS OF FEMININE HONOR**

Amanda L. Martens

10:55 **PREDICTING AND EXPLAINING BEHAVIORAL INTENTION AND HAND SANITIZER USE AMONG U.S. ARMY SOLDIERS**

Naiqing Lin

11:10 **CONTEXTUAL FACTORS RELATED TO SEXUAL ASSAULT SURVIVORS REPORTING TO UNIVERSITIES**

Chelsea Spencer

11:25 **WHAT IF THEY THINK I'M RACIST? FACTORS THAT AFFECT DECISIONS TO DISCUSS DIVERSITY INITIATIVES**

Conor O'Dea

Agricultural Sciences 2

ECE Conference Room

12:45PM – 2:30PM

- 12:45 **NOCTURNAL TRANSPIRATION IN A TALLGRASS PRAIRIE COMMUNITY**
Kimberly O'Keefe
- 1:00 **GEOMETRIC MEASUREMENTS OF FIELD CROPS DURING EARLY GROWTH STAGES USING A TIME OF FLIGHT CAMERA**
Justin Frazier
- 1:15 **PHYSIOLOGICAL, BIOCHEMICAL AND MOLECULAR BASIS OF RESISTANCE TO PS II- AND ALS-INHIBITORS IN PALMER AMARANTH FROM KANSAS**
Sridevi Betha
- 1:30 **PHENOTYPIC VARIATION OF THE DOMINANT PRAIRIE GRASS *ANDROPOGON GERARDII* AND ASSOCIATION WITH CLIMATE ACROSS MIDWEST GRASSLANDS CLIMATE GRADIENT**
Jacob Alsdurf
- 1:45 **MOBILE DRIP IRRIGATION: PROSPECTIVE TECHNOLOGY TO IMPROVE WATER PRODUCTIVITY OF CORN**
Gia H.T. Nguyen
- 2:00 **PHYSICAL MAPPING OF EPSPS GENE COPIES IN GLYPHOSATE RESISTANT ITALIAN RYEGRASS POPULATIONS**
Karthik Putta
- 2:15 **UNDERSTANDING THE RELATIONSHIP BETWEEN URBAN BEST MANAGEMENT PRACTICES AND ECOSYSTEM SERVICES**
Kelsey McDonough

Engineering/Math/Physical Sciences 2

1044 Rathbone

12:45PM – 3:25PM

**12:45 SEPARATION OF MOLECULAR ISOMERS BY COULOMB EXPLOSION IMAGING AFTER
INNERSHELL PHOTOIONIZATION WITH X-RAYS**

Utug Ablikim

**1:00 STRONG TUNABLE VISIBLE ABSORPTION PREDICTED FOR POLYSILO-ACENES
USING TDDFT CALCULATIONS**

K. L. Dimuthu M. Weerawardene

**1:15 COMPARISON OF GEOCHEMISTRY GENERATED BY KIMBERLITE WEATHERING VS.
LIMESTONE WEATHERING IN KANSAS**

Colleen M. Gura

1:30 NON-GAUSSIAN ERROR DISTRIBUTIONS OF LMC DISTANCE MODULI MEASUREMENTS

Sara Crandall

**1:45 GEOCHEMICAL CONTROLS ON ARSENIC AND MANGANESE RELEASE INTO
GROUNDWATERS FROM SEDIMENTS: IN RELATION TO NATURAL REACTIVE
BARRIER**

Michelle Berube

BREAK

2:10 MICROWAVE EFFECTS ON CdSe NANOCRYSTALS SYNTHESIS

Bemnet A. Kebede

**2:25 SCALE A MID-INFRARED OPTICALLY PUMPED GAS-FILLED HOLLOW-CORE FIBER
LASER TO HIGH POWER**

Neda Dadashzadeh

**2:40 SPECTROSCOPIC SINGLE-MOLECULE TRACKING REVEALS THE ONE-DIMENSIONAL
DIFFUSION PATHWAYS IN SURFACTANT-TEMPLATED MESOPOROUS SILICA**

Ruwandi Kumarasinghe

**2:55 MONITORING THE BIOGEOCHEMISTRY OF SHALLOW AQUIFER GROUNDWATER TO
DETERMINE SOURCE SUPPLY AND PREDICT REACTIONS UPON CO₂ INJECTION
INTO WELLINGTON FIELDS, KS**

Ian Andree

3:10 KINETICS OF FRACTAL AGGREGATE SOL TO GEL TRANSITION

Raiya Ebini

Social Sciences/Humanities/Education 3

1094 Fiedler

1:00PM –2:45PM

- 1:00 **A NONPARAMETRIC APPROACH TO ESTIMATE MULTIPRODUCT AND PRODUCT-SPECIFIC SCALE AND SCOPE ECONOMIES FOR AGRICULTURAL COOPERATIVES**
Krishna P Pokharel
- 1:15 **MODELLING THE IMPACT OF AIRLINE PRODUCT QUALITY ON AIRLINES' AND PASSENGERS' CHOICE BEHAVIOR**
Jules O. Yimga
- 1:30 **EXPENDITURE CONSTRAINED FARM PRODUCTION IN ARMENIA**
Weldensie T. Embaye
- 1:45 **DOES CONSUMER CONFIDENCE AFFECT DURABLE GOODS SPENDING DURING BAD AND GOOD ECONOMIC TIMES EQUALLY?**
M Iqbal Ahmed
- 2:00 **FINDING COMMON SUPPORT THROUGH LARGEST CONNECTED COMPONENTS**
Sharif Mahmood
- 2:15 **FOREIGN VERSUS NATIONAL: THE EFFICIENCY OF ETHANOL PLANTS IN BRAZIL**
Ana Claudia Sant'Anna
- 2:30 **ENGLISH LANGUAGE PROFICIENCY AND EMPLOYMENT AMONG IMMIGRANTS IN US: EVIDENCE FROM NEW IMMIGRATION SURVEY**
Haydory Akbar Ahmed

Biological Sciences

2064 Rathbone

1:15PM – 3:25PM

1:15 **SUSCEPTIBILITY TO FUSARIUM THAPSINUM IN GRAIN SORGHUM INVOLVES HOST TRANSCRIPTIONAL REPROGRAMMING**

Ananda Bandara

1:30 **CHARACTERIZATION OF VIRULENCE OF GENETICALLY DISTINCT RIFT VALLEY FEVER VIRUS STRAINS IN MICE**

Aaron Balogh

1:45 **ASSESSMENT OF LIGHT CHAIN DIVERSITY IN NAÏVE MOUSE ANTIBODY REPERTOIRE**

Claire Ward

2:00 **MICROALGAE ORGANELLE ISOLATION AND ENZYME DISRUPTION AS PART OF AQUEOUS ENZYMATIC EXTRACTION**

Chelsea Dixon

BREAK

2:25 **FINDING BINDING PREFERENCES AND ENHANCING SOLUBILITY OF ERLOTINIB AND ITS MIMICS**

Manomi Perera

2:40 **VALIDATION AND CHARACTERIZATION OF INSECT VECTOR PROTEINS THAT INTERACT WITH *TOMATO SPOTTED WILT VIRUS***

Catherine L. Stewart

2:55 **BONE MICRO-ENVIRONMENT TARGETED MAGNETIC NANOMEDICINE**

Tuyen Duong Thanh Nguyen

3:10 **GENETICS OF SPERMATOPHORE COAT FORMATION IN THE GROUND CRICKET (*ALLONEMOBIUS SOCIUS*)**

Bettina M Jancke

Poster Titles and Presenters

Agricultural Sciences 1

Engineering Atrium

On display: 9:30AM – 5:00PM

Judging: 10:00AM – 12:00PM

- 1. IDENTIFICATION AND QUANTIFICATION OF CAROTENOIDS IN VARIOUS PHENOTYPIC SORGHUM ACCESSIONS**
Yanting Shen
- 2. CHARACTERIZATION OF ANTHOCYANINS IN SWEET POTATO SHOOTS**
Xiaoyu Su
- 3. DEVELOPMENT OF A ROCKY MOUNTAIN/SOUTHWESTERN GLUTEN-FREE VEGAN ENCHILADA MEAL**
Yuda Ou
- 4. INFLUENCE OF PACKAGING TYPE ON SHELF LIFE OF FOOD SERVICE PACKAGED BACON SLICES**
MaryAnn J. Matney
- 5. IMPACT OF IODINE VALUE ON FRESH PORK BELLY CHARACTERISTICS AND BACON QUALITY**
Garrett McCoy
- 6. PARTICULATE FLOW MEASUREMENTS AND IMPLICATIONS IN FOOD EXTRUSION**
Cameron McGuire
- 7. DO PETS LIKE SORGHUM IN THEIR FOOD?**
Brizio Di Donfrancesco

Biological Sciences

Engineering Atrium

On display: 9:30AM – 5:00PM

Judging: 10:00AM – 12:00PM

8. SYSTEMATIC REVIEW AND META-ANALYSIS: IS LIFESTYLE MODIFICATION EFFECTIVE FOR GLYCEMIC CONTROL AMONG TYPE II DIABETIC ADULTS IN SOUTHEAST ASIA?

Zaw Wai Htoo

9. IN-VITRO ACTIVITIES STUDIES OF D-K_{6L} PEPTIDE DERIVATIVES

Jing Yu

10. DOES MODERATE INTENSITY EXERCISE IN THE POSTPRANDIAL PERIOD ATTENUATE THE INFLAMMATORY RESPONSE TO A HIGH-FAT MEAL

Colby S Teeman

11. CHANGES IN INTAKE OF CVD-RELATED FOOD COMPONENTS ASSOCIATED WITH AN INTERVENTION TO REDUCE SEDENTARY TIME

Kelsey Casey

12. MODULATION OF OMEGA-3 FATTY ACID PROFILE IN THE DUCK LIVER BY VARIOUS DIETARY FATS

Xi Chen

13. NITRITE ENHANCES MICROVASCULAR OXYGEN PRESSURE DYNAMICS IN HEALTHY RAT SKELETAL MUSCLE

Trenton Colburn

Engineering, Math, & Physical Sciences 1

Engineering Atrium

On display: 9:30AM – 5:00PM

Judging: 10:00AM – 12:00PM

14. Q-SPACE ANALYSIS OF LIGHT SCATTERING FROM GAUSSIAN RANDOM SPHERES

Justin Maughan

15. LASER-INDUCED DISSOCIATION DYNAMICS AND VIBRATIONAL MOTION IN DIODOMETHANE

Balram Kaderiya

16. ELECTRON AND NUCLEAR DYNAMICS IN GOLD THIOLATED PROTECTED NANOCLUSTERS ($\text{Au}_{18}\text{SH}_{14}$, $\text{Au}_{25}\text{SH}_{18}^{-1}$) – A THEORETICAL INVESTIGATION

Ravithree Senanayake

17. MACHINE LEARNING FOR SPATIOTEMPORAL PREDICTIVE ANALYSIS IN INFORMATICS APPLICATIONS

Heath Yates

18. HYDROGEOLOGIC CHARACTERIZATION OF ARKANSAS RIVER ALLUVIAL DEPOSITS USING ELECTRICAL RESISTIVITY IMAGING

Weston J. Koehn

~~19. PROGRESS TOWARDS THE TOTAL SYNTHESIS AND STRUCTURAL ELUCIDATION OF LAGUNAMIDE C~~

Chelsea Weese

~WITHDREW~

20. ATOMIC FORCE MICROSCOPY STUDIES OF CONFORMATIONAL CHANGES IN PROTEINS AND PEPTIDES

Nicoleta Teodora Ploscariu

21. CHARACTERIZING SOIL EROSION POTENTIAL USING ELECTRICAL RESISTIVITY

Md Zahidul Karim

Engineering, Math, & Physical Sciences 2

Engineering Atrium

On display: 9:30AM – 5:00PM

Judging: 10:00AM – 12:00PM

22. THE INFLUENCE OF WINDWARD PARAPETS ON THE HEIGHT OF LEEWARD SNOW DRIFTS AT ROOF STEPS

Christopher B. Goodale

23. A NEW CLASS OF DIRECT-DRIVE WIND TURBINES

Akanksha Singh

24. WAVELET ENHANCED CBLE SCORES TO IMPROVE P300 SPELLER PERFORMANCE

Md Rakibul Mowla

25. VISUALIZATION INVESTIGATION OF DROPWISE CONDENSATION ON HYDROPHOBIC SURFACE IN MINI-GAPS

Xi Chen

26. MORPHING CONTINUUM DESCRIPTION FOR BOUNDARY LAYER TRANSITION AND TURBULENCE

Louis Wonnell

27. A VISUALIZATION TOOL FOR MULTIVARIATE PROCESS MONITORING IN DATA ABUNDANT ENVIRONMENT

Siim Koppel

28. A FUZZY MADM METHOD FOR UNCERTAIN ATTRIBUTES USING RANKING DISTRIBUTION

Mohammadhossein Amini

29. 3D PRINTED POINT-OF-CARE DEVICE FOR ANEMIA DIAGNOSIS

Kimberly Plevniak

30. ANALYTICAL AND FINITE ELEMENT BUCKLING SOLUTIONS OF SIMPLY SUPPORTED LAMINATED COMPOSITE COLUMNS AND WIDE PALTES UNDER AXIAL COMPRESSION

Rund Al-Masri

31. A GAIT ANALYSIS STUDY USING THE MICROSOFT KINECT

Behnam Malmir

32. CARBON NANOTUBE-SUPPORTED CATALYSTS FOR FISCHER-TROPSCH SYNTHESIS

Xu Li

33. CONTROLLING LIGHT IN SPACE, TIME AND COLOR FOR ADVANCED LASER-BASED MANUFACTURING

Xinya Wang

Agricultural Sciences 2

Engineering Atrium

On display: 9:30AM – 5:00PM

Judging: 1:30PM – 3:30PM

34. DIVERGENCE IN PHENOTYPES AND GENOMES AMONG ECOTYPES OF A WIDESPREAD GRASS, BIG BLUESTEM, ACROSS A GREAT PLAINS' CLIMATE GRADIENT

Matthew Galliard

35. EVALUATING ZOYSIAGRASS-TALL FESCUE MIXTURES IN THE TRANSITION ZONE

Mingying Xiang

36. UNDERSTANDING BIOCHEMICAL CONTRIBUTIONS TO RESILIENCE OF SOIL ORGANIC CARBON SEQUESTRATION IN SOILS FROM CONTRASTING AGROECOSYSTEMS

Dorothy S. Menefee

37. ESTIMATE CONTRIBUTIONS OF KANSAS PRESCRIBED PASTURE BURNING TO AMBIENT PM_{2.5} THROUGH SOURCE APPORTIONMENT USING UNMIX RECEPTOR MODEL

Yang Liu

38. IMPROVED DISEASE RESISTANCE IN TRANSGENIC WHEAT USING ANTIMICROBIAL PEPTIDE GENES

Jordan Brungardt

39. YIELD POTENTIAL AND NUTRITIONAL QUALITY ATTRIBUTES IN ALS HERBICIDE RESISTANT SORGHUMS

Dilooshi Weerasooriya

40. LONG-TERM TRENDS OF NITROGEN CONCENTRATION IN TALLGRASS PRAIRIE STREAMS

James Guinnip

41. UPTAKE, TRANSLOCATION AND METABOLISM OF DICAMBA IN DICAMBA-RESISTANT KOCHIA FROM KANSAS

Junjun Ou

Social Sciences/Humanities/Education

Engineering Atrium

On display: 9:30AM – 5:00PM

Judging: 1:30PM – 3:30PM

42. EXAMINING THE EFFECTS OF KNOWLEDGE, ENVIRONMENTAL CONCERN, ATTITUDES AND CULTURAL CHARACTERISTICS ON KUWAITI CONSUMERS' PURCHASING BEHAVIOR OF ENVIRONMENTALLY SUSTAINABLE APPAREL

Hayat Albloushy

43. ADVICE FROM THE EXPERIENCES OF PARENTS WITH A CHILD WITH DOWN SYNDROME

Adam Cless

44. ON-SITE AND ONLINE GIRL SCOUT LEADER WELLNESS TRAINING FOR PHYSICAL ACTIVITY IN TROOP MEETINGS

Brooke J. Cull

45. INJURY RELATED ISSUES AMONG FEMALE FIREFIGHTERS: A QUALITATIVE STUDY

Brittany S. Hollerbach

46. PERCENTAGE OF CROSSFIT WORKOUTS AS INTERVALS

Victor Andrews

47. WHAT'S IN A MUGSHOT: VISUAL CHARACTERISTICS NEWSPAPER MEDIA EMPHASIZE BASED ON RACE AND GENDER

Alayna Fahrny

48. HOPE, COPING, AND RELATIONSHIP QUALITY IN MOTHERS OF CHILDREN WITH DOWN SYNDROME

Jessica High

~~**49. PUBLIC ATTITUDES AND PERCEPTIONS OF WIND ENERGY DEVELOPMENT WITHIN THE ROLLING PLAINS AND BREAKS ECOLOGICAL REGION**~~

Ferry Tucker

~WITHDREW~

50. DOES ALLOCATION OF TIME REALLY MATTER FOR THE WOMEN'S EMPOWERMENT? AN EVALUATION OF WOMEN'S EMPOWERMENT INDEX IN AGRICULTURE WEAI

Sandra Contreras

51. HOSTILITY, ATTACHMENT, AND FORGIVENESS: A PATHWAY TO STRENGTH IN RELATIONSHIPS

Austin Beck

52. AN EXPLORATION OF PTSD AS A MEDIATOR BETWEEN TRAUMA EXPOSURE AND ATTACHMENT BEHAVIORS IN MARRIED ADULTS

Lauren Oseland

Interdisciplinary

Engineering Atrium

On display: 9:30AM – 5:00PM

Judging: 1:30PM – 3:30PM

53. BIODEGRADABLE STARCH/PVOH/LAPONITE RD BASED BIONANOCOMPOSITE FILMS FOR FOOD PACKAGING APPLICATIONS: PREPARATION, CHARACTERIZATION AND REINFORCEMENT WITH GRAPHENE OXIDE

Pavan Harshit Manepalli

54. APPLICATION OF CELLULOS AND LIGNIN-COATED CELLULOSE BASED NANOFILLERS FOR BIO-BASED PACKAGING

Jingwen Xu

55. OPTIMUM AMOUNT OF *RHUS GLABRA L.* AS A NATURAL MORDANT

Sarif Patwary

56. NOVEL APPLICATION OF AUTOLYTIC ENZYME: IMPLICATION ON PRETREATMENT STRATEGIES OF BIOPRODUCT EXTRACTION FROM MICROALGAE

Laura Soto Sierra

57. MORPHOLOGY-DRIVEN REPELLENT NANOWEBES

Yue Yuan

58. OPTIMIZATION OF LIGNOCELLULOSIC BIOMASS-TO-BIOFUEL SUPPLY CHAINS WITH DENSIFICATION: A REVIEW

Nibal Albashabsheh

59. DESIGN OF A HANDHELD PHENOTYPING PLATFORM

Yong Wei

60. OPTIMIZE ULTRASONIC PRETREATMENT TO ENHANCE GLUCOSE YIELDS OF BIG BLUESTEM USING RESPONSE SURFACE METHODOLOGY

Youjie Xu

61. RAPID EVOLUTION IN A DISTURBED ENVIRONMENT: EVOLUTIONARY RESPONSE OF WIDESPREAD GRASS *ANDROPOGON VIRGINICUS* TO HEAVY METALS IN AN ABANDONED MINE SITE

Samantha Sharpe

62. AN AGENT-BASED MODELING APPROACH TO IMPROVE COORDINATION BETWEEN HUMANITARIAN RELIEF PROVIDERS

Megan Menth

63. SIZE AND TIMING MATTER: DIFFERENTIAL TRIGLYCERIDE RESPONSES TO THREE MEAL CONDITIONS

Sam R. Emerson

64. SENTIMENT ANALYSIS OF NEWS ARTICLES AND TWITTER DATA OF COMPANIES

Keerthi Korivi

Oral Presentation Abstracts

Engineering/Math/Physical Sciences 1

DEVELOPMENT OF NEW SAFETY PERFORMANCE FUNCTIONS FOR RURAL FOUR-LANE DIVIDED SEGMENTS IN KANSAS

Syeda Rubaiyat Aziz and Sunanda Dissanayake
Department of Civil Engineering, College of Engineering

BACKGROUND AND PURPOSE: Rural roads in Kansas account for 90.7% of the 140,686 total roadway miles in the state. Fatal crashes in rural areas comprise of approximately 66% of total fatal crashes in Kansas, making rural roadways a critical safety issue. The Highway Safety Manual (HSM) provides models and methodologies for safety evaluation and safety performance prediction of roadways. For increased accuracy of the results of the HSM methodologies, states have been encouraged to customize the methodologies with local data. Crash prediction methodology in the HSM consists of Safety Performance Functions (SPF) where the number of predicted crashes is obtained based on dependent variables. After performing calibration using the HSM methodology, under-prediction was observed for total crashes and over-prediction was observed for fatal and injury crashes, indicating the need to develop Kansas-specific SPF. **METHOD:** In order to develop new SPF, 200 segments were randomly selected from total 281 rural four-lane divided segments. The remaining segments will be used for new SPF validation. Crash frequency and traffic volume data were considered for years 2011-2013. **RESULTS/FINDINGS:** In addition to the HSM-given SPF variables, several new parameters such as driveway density per mile, presence of horizontal curve, presence of rumble strips, posted speed limit and roadside hazard rating are being considered in the Kansas-specific SPF. Final model will undergo a set of validation segments to check its applicability for crash prediction of rural four-lane divided segments. **CONCLUSION:** Developing a reliable crash prediction methodology will enable identifying potential crash locations and ultimately provide safer highways for rural Kansas.

AN ADAPTIVE SINUSOIDAL PULSE WIDTH MODULATION TECHNIQUE FOR CASCADED MULTILEVEL CONVERTERS

Jacob Lamb and Behrooz Mirafzal
Department of Electrical and Computer Engineering, College of Engineering

BACKGROUND AND PURPOSE: Multilevel converters, such as the cascaded H-bridge (CHB) converter, have been receiving increasing attention due to their potential to be used for medium- and high-power applications where electrical energy must be converted from dc to ac, e.g. traction motor drives. When using a multilevel converter, desired waveforms are typically generated via well-established multilevel pulse width modulation (PWM) techniques, such as level-shifted sinusoidal PWM (SPWM), which require the dc-sources powering the CHB to have known magnitudes which are equal and time-invariant. In applications which use batteries, fuel cells, or supercapacitors, however, source discharging causes source magnitudes to be time-variant. Further, discrepancies in construction, asymmetric aging, or unbalanced discharging may cause such sources to become unequal. As such an adaptive PWM technique, which allows a CHB to generate waveforms when sources are unequal, time-variant, and have unknown magnitudes, is needed. **METHOD:** Two alternative algorithms for implementing an adaptive variation of level-shifted SPWM were developed and verified using MATLAB/Simulink simulation software. The two implementations differ in the sensor configuration utilized and the behavior when an update is required. **RESULTS/FINDINGS:** Simulation results show that both adaptive SPWM algorithms allow for time-variant, asymmetric sources with unknown magnitudes to be used to generate a desired waveform. **CONCLUSION:** Using the developed adaptive SPWM techniques a CHB can directly utilize sources such as batteries, fuel cells, or supercapacitors. Future work will include experimentally verifying the algorithms developed, as well as adding fault tolerant features to adaptive SPWM.

Fe₃O₄-GRAPHENE ANODE MATERIALS WITH IMPROVED CYCLING PERFORMANCE FOR LI-ION BATTERIES

Huan Wang and Placidus B. Amama

Department of Chemical Engineering, College of Engineering

BACKGROUND AND PURPOSE: The development of higher power and energy density lithium-ion batteries has become more critical due to large demands of advanced portable electronics in today's society. Nanostructured materials have shown promise in alleviating some of the fundamental limitations associated with current electrodes. There is therefore increasing interest from researchers in using nanocarbon materials with outstanding properties as the nanoscale building blocks for electrode materials. Here, we demonstrate high rate capability, high cyclic stability, and high Coulombic efficiency of Fe₃O₄/graphene anode materials. **METHOD:** A facile wet chemistry method was utilized to synthesize Fe₃O₄/graphene oxides nanocomposites. Vertically aligned Fe₃O₄/graphene (VA- Fe₃O₄/graphene) anodes on a current collector were prepared via a novel pretreatment followed by calcination at 600 °C. **RESULTS AND CONCLUSION:** The VA- Fe₃O₄/graphene anode not only facilitates enhanced lithium ion and electron transport, but also simplifies the electrode fabrication process by not requiring a binder and conductive additives. At relatively low specific currents, the VA-Fe₃O₄/graphene shows high reversible specific capacities (up to 750 mAh/g at 156 mA/g). Interestingly, at high discharge rate (1560 mA/g), the capacity of VA-Fe₃O₄/graphene anode is 345 mAh/g (with capacity retention of 90%) after 100 cycles; conversely, the unaligned Fe₃O₄/graphene sample is characterized by a lower capacity (178 mAh/g) under similar conditions. These results suggest that the structure of VA- Fe₃O₄/graphene is a promising electrode system for improved LIB performance. Characterization of the electrode materials to rationalize the role of alignment is ongoing.

EPITAXY OF BORON PHOSPHIDE ON ALUMINUM NITRIDE(0001)/SAPPHIRE SUBSTRATE

Balabalaji Padavala¹, Clint Frye¹, Xuejing Wang², Zihao Ding², Ruifen Chen², Michael Dudley², Balaji Raghothamachar², Peng Lu³, Bret Flanders⁴, and James Edgar¹

¹*Department of Chemical Engineering, College of Engineering;* ²*Department of Materials Science and Engineering, Stony Brook University, NY;* ³*Nitride Solutions Inc., Wichita, KS;* ⁴*Department of Physics, College of Arts and Sciences*

BACKGROUND AND PURPOSE: New materials that are cost efficient are needed for neutron detectors to prevent the smuggling of nuclear weapons across borders. The semiconductor boron phosphide (BP) is a good candidate for purpose, but it must be of high crystal quality in order to optimize its properties for effective and efficient devices. BP films produced in prior studies had poor electrical properties due to the unintentional introduction of impurities and defects caused by mismatch of properties with the substrate, usually silicon. Recently, new potentially superior substrates such as AlN, 4H-SiC, 3C-SiC and ZrB₂ are investigated with the goal of improving the overall properties of BP. **METHOD:** Here, AlN(0001)/sapphire substrate was investigated for depositing BP epitaxial films. High quality BP films were grown on AlN(0001)/sapphire at 1000-1200°C by chemical vapor deposition method. The effect of process variables on overall properties of BP was examined in detail. **RESULTS:** BP deposited at high temperatures (1200°C) and high reactant flow rate ratios produced films with enhanced crystalline quality. Specifically, the peak widths of BP Raman peaks (6.1 cm⁻¹) and x-ray diffraction rocking curves (352 arcsec) were narrow compared to values reported in literature, confirming the high crystalline quality of produced films. Raman imaging of BP films deposited on AlN/sapphire indicated better crystalline quality in terms of peak shift, peak width and residual strain compared to films deposited on 4H-SiC(0001) and 3C-SiC(100)/Si substrates. **CONCLUSION:** This preliminary study demonstrate that AlN is an excellent substrate for growing high quality BP epitaxial films with promising potential for further enhancement of BP properties.

SENSITIVITY OF MICROWAVE ABLATION MODELS TO TISSUE BIOPHYSICAL PROPERTIES: A FIRST STEP TOWARDS PROBABILISTIC MODELLING AND TREATMENT PLANNING

Jan Sebek, Nathan Albin, Radoslav Bortel, Bala Natarajan, and Punit Prakash
Department of Electrical and Computer Engineering, College of Engineering

MOTIVATION: Microwave ablation (MWA) is a treatment modality for minimally-invasive thermal destruction of tumors. Computational models of MWA are used during the design optimization of novel devices, and are under consideration for patient-specific treatment planning. The objective of our study was to assess the sensitivity of computational models of MWA to tissue biophysical properties. **METHOD:** The Morris method was employed to assess the global sensitivity of a coupled electromagnetic-thermal model, which incorporated temperature dependencies of tissue physical properties. The variability of the model was studied on the size and shape of the thermally damaged area, and on power efficiency of the applicator. **RESULTS:** A total of 1221 simulations were performed. All tissue dielectric parameters were identified as the most influential parameters for the shape of the ablation zone and antenna impedance matching. Of the thermal parameters considered in this study, the nominal blood perfusion rate and the temperature interval across which the tissue changes phase were identified as more influential. The latent heat of tissue water vaporization and the volumetric heat capacity of the vaporized tissue were recognized as the least influential parameters. **CONCLUSION:** Out of all 10 input dielectric and thermal properties of tissue, 5 were recognized as the ones having major influence on the outcome, on the other side, 2 parameters were recognized as negligible ones providing an opportunity to make the overall model simpler. This study provides a framework for future efforts looking to incorporate the uncertainty associated with tissue biophysical properties for patient specific ablation treatment planning.

DEGRADATION OF GRAPHITE DUE TO AIR INGRESS AT HIGH TEMPERATURES

Dan Gould, Eric Schlaikjer, and Hitesh Bindra
Department of Mechanical and Nuclear Engineering, College of Engineering

BACKGROUND AND PURPOSE: One of the most promising Generation 4 nuclear reactor designs is the Very High Temperature Reactor (VHTR). Using graphite as a moderator and helium as a coolant, the VHTR design is capable of achieving significantly higher thermal efficiencies than those obtained by currently operating reactors due to its much higher peak coolant temperature of approximately 900 °C. However, these high temperatures also impose significant design challenges with regards to the selection of suitable materials. While several grades of pyrolytic graphite have been shown to easily withstand the high temperatures and pressures normally experienced within a VHTR, there is a continuing concern that in the event of an air-ingress accident unexpected complications might arise if significant amounts of surface oxidation were to occur. **METHODOLOGY:** In this work, the effects of suddenly exposing graphite to a high temperature, oxidizing flow were studied. A hollow graphite cylinder, scaled to represent a flow channel within a VHTR core, was heated in a helium environment to 900 °C. Once this temperature had been achieved, an air-ingress accident was simulated by initiating a sudden flow of atmospheric air through the cylinder. The thermal response of the graphite to this oxidizing flow was then observed with a thermographic camera. **RESULTS AND CONCLUSIONS:** The resulting changes to the physical and chemical properties of the graphite test piece were analyzed. It was found that the oxidation of the graphite surface resulted in a decrease in its emissivity over the LWIR spectrum - potentially seriously reducing its ability to dissipate excess heat.

MODELING AND STABILITY ANALYSIS OF GRID-INTERACTIVE VOLTAGE SOURCE INVERTER (VSI)

Aswad Adib and Behrooz Mirafzal

Department of Electrical and Computer Engineering, College of Engineering

BACKGROUND AND PURPOSE: DC to AC Converters or Inverters are needed to integrate renewable energy sources to the electric grid. For the integration of these renewable sources, Voltage Source Inverter (VSI) is the most popular choice. This connection to the grid has to be done in such a manner that the VSI system remains stable. For that, tools such as models are necessary which will provide an accurate representation of the system. Based on such models stability analysis of the system becomes possible. In literature, existing models for grid-interactive VSI are present but a model which ensures stability analysis for all the system parameters is yet to be found. Such a comprehensive model is reported here. **METHOD:** In this work, an averaged state space model of the grid-interactive VSI is developed. Performing linearization on the developed model a small signal model is also obtained. **RESULTS:** The developed model is a good representation of the actual system as was verified by simulation. Eigenvalue Sensitivity Analysis of the small signal model provided a comprehensive stability analysis of the system for all the system parameters. **CONCLUSION:** A novel state space model for the grid-interactive VSI has been developed which can be used as an analysis tool by the power industry. Such a tool will make it possible for more robust connection of renewable sources to the grid facilitating more renewable energy penetration.

A FIRST-PRINCIPLES INVESTIGATION OF HEXAGONAL BORON NITRIDE GROWTH ON NICKEL SURFACES

Song Liu, Bin Liu, and James H. Edgar

Department of Chemical Engineering, College of Engineering

BACKGROUND AND PURPOSE: Hexagonal boron nitride (h-BN) has long been widely used as an electrical insulator and heat-resistant material because of its high electrical resistivity, and chemical and thermal stability. Detailed mechanistic understanding of h-BN crystal growth is critical to improve h-BN synthesis techniques for high quality crystal formation. In this work, a first-principles-based computational investigation is presented to understand the fundamental mechanism of atomically thick h-BN growth on nickel surfaces. **METHOD:** Density functional theory (DFT) calculations are performed to obtain the energetics and kinetics of the key chemistries describing BH_2NH_2 adsorption, decomposition, nucleation site formation, and growth on Ni(111) and Ni(211) surfaces. **RESULTS/FINDINGS:** Based on DFT calculations, potential energy surfaces were constructed to describe BH_2NH_2 dehydrogenation, and B-N bond formation on the Ni(111) and Ni(211) surfaces. The Ni(211) surface is energetically favored compared to the Ni(111) surface during the dehydrogenation stage. This suggests that Ni(211) is responsible for generating and stabilizing the nucleation sites for subsequent h-BN growth. The diffusion of B and N species and B-N bond formation are favored on the terraced Ni(111) surface, indicating that larger crystal growth most likely takes place on the flat Ni surfaces. **CONCLUSION:** The early stage of h-BN formation on nickel surfaces has been investigated using DFT calculations. The roles of nickel terrace and step sites are understood, and the energetics and kinetics were also obtained to support the fundamental mechanism for large-scale h-BN growth on nickel, for more extensive research on the complex h-BN CVD process.

MAGNETIC RESONANCE THERMOMETRY GUIDANCE FOR PRE-CLINICAL HYPERTHERMIA EXPERIMENTS IN SMALL-ANIMALS

Pegah Faridi¹, Sergio Curto¹, Leila Maurmann², Stefan Bossmann², and Punit Prakash¹

¹Department of Electrical and Computer Engineering, College of Engineering; ²Department of Chemistry, College of Arts and Sciences

BACKGROUND AND PURPOSE: Thermal therapy is a minimally invasive tumor treatment which has been shown to improve the efficacy of radiation and/or chemotherapy, and is under investigation for heat-triggered release of therapeutic agents. An integrated instrument for Magnetic Resonance Imaging (MRI) -guided delivery of thermal therapy is under development at KSU. MRI offers the opportunity of temperature monitoring which may facilitate feedback control techniques for precise hyperthermia delivery. The purpose of this study is to evaluate the accuracy of MRI temperature monitoring during microwave hyperthermia within a 14 T small-animal scanner. **METHOD:** An MRI compatible microwave antenna is used to heat an agar phantom. The accuracy of MRI thermometry (FLASH, TR=50 ms, TE=2.6 ms, FOV=35, slice thickness=0.4 mm) are validated against measurements with a fiberoptic temperature probe. Two types of images are derived from MRI: the magnitude image which monitors anatomic detail, the phase image which contains temperature information. The phantom was heated with microwave energy considering a large range of powers (25 to 48 W for 10 min) while being monitored in the MRI to collect the phase images and calculate the temperature. **FINDINGS:** The maximum discrepancy over 4 minutes heating between MRI thermometry and fiberoptic measurements was 0.7 °C. The uncertainty in temperature measurements in the absence of heating was in the range of 0.15 °C with 0.0334 °C standard deviation. **CONCLUSION:** MRI is a preferred choice for hyperthermia monitoring. These results will facilitate investigation of image-based feedback control algorithms for guiding hyperthermia procedures.

REPEATABILITY AND SENSITIVITY ANALYSIS OF THE BANCS MODEL DEVELOPED TO PREDICT ANNUAL STREAMBANK EROSION RATES

Kari A. Bigham¹, Trisha L. Moore¹, Tim D. Keane², and Jason R. Vogel³

¹Department of Biological and Agricultural Engineering, College of Engineering; ²Department of Landscape Architecture/Regional and Community Planning, College of Architecture, Planning and Design; ³Department of Biosystems and Agricultural Engineering, Oklahoma State University

BACKGROUND AND PURPOSE: Excess sediment in streams is a leading cause of stream impairment in the United States, resulting in poor water quality, sedimentation of downstream waterbodies, and damage to aquatic ecosystems. Numerous case studies have found that accelerated channel and bank erosion can be the main contributor of sediment in impaired watersheds. An empirically-derived "Bank Assessment for Non-Point Source Consequences of Sediment" (BANCS) model can be developed for a specific region to rapidly estimate annual lateral bank retreat rates, based on both physical and observational measurements of a streambank. This study aims to address model criticisms by evaluating the model's repeatability within and between users and identifying highly sensitive and/or uncertain model inputs. **METHOD:** Ten stream professionals with experience utilizing the BANCS model individually evaluated the same six streambanks twice in the summer of 2015, based on current model streambank assessment methodology. To determine the model's repeatability, individual streambank evaluations will be statistically analyzed with a mixed model. A "one-at-a-time" design approach was implemented to test sensitivity of model inputs. **PRELIMINARY RESULTS AND CONCLUSION:** Preliminary statistical analysis of individual streambank evaluations suggest that the implementation of the BANCS model may not be repeatable between users, based on current streambank assessment methodology. This may be due to highly sensitive model inputs, such as streambank height, and/or highly uncertain model inputs, such as bank material. By identifying model inputs that require accurate measurement and analysis in order to obtain true and repeatable model outputs, these findings may improve future BANCS model implementation and creation.

“SHUT IT DOWN!”: NEGOTIATING POST-FEMINIST WORK/LIFE IN *30 ROCK*

Katrina N. Hanna

Department of Communication Studies, College of Arts & Sciences

BACKGROUND AND PURPOSE: A critical examination of how popular television shows influence and shape who we are cannot be underestimated. As women continue to witness inequality within the workplace, it becomes vital to analyzing how popular culture media depict women and work. **METHODS:** Derived from a post-feminist perspective which upholds neoliberalist’s views on agency, this investigation analyzes the first season of *30 Rock* and how it portrays its leading lady, Elizabeth Lemon. Bound within the post-feminist framework, Lemon is constantly negotiating her work and private life as a heterosexual, white, single woman. **RESULTS:** Through my analysis, I find that Lemon is able to uphold the ideal post-feminist through her struggle to maintain her femininity while being successful at her job; a battle which ultimately positions her femininity against the ideal worker norm. **CONCLUSION:** In the end, Lemon must assume nurturing roles at work in order to make up for her status as a single woman. The paper concludes with a discussion of the implications of these findings and a call for future research.

THE EFFICACY OF TARGETED VS NONTARGETED TACTICS IN WAR TERMINATION

Alyssa Jackson

Security Studies, College of Arts and Sciences

BACKGROUND AND PURPOSE: Recent studies regarding war termination and the bargaining theory of war focus on how belligerents use coercion to reach a war settlement, but neglect the importance of tactical decisions. Although strategies are the principal tool used to conduct war, only significant tactical achievements lead to significant strategic achievements. **METHOD:** In this paper I analyze the tactics employed in two case studies, the Second Boer War between Great Britain and the South African Boers and the Winter War between the Soviet Union and Finland. I discuss two categories of tactics: *targeted tactics* which concentrate resources on strategic goals, use resources discriminately, and target the enemy’s ability to fight, and *nontargeted tactics* which lack these characteristics. **RESULTS:** I demonstrate that targeted tactics have a marked impact on the duration and outcome of warfare, minimizing the effects of military technology advances, increasing the importance of accuracy and force employment, and applying pressure to strategies that rely on superior resources. **CONCLUSION:** Targeted tactics are a significant tool in warfare that affect war termination and deserve increased study as the most effective means to conduct warfare.

YOUR ENVIRONMENT AND YOU: INVESTIGATING STRESS TRIGGERS AND CHARACTERISTICS OF THE BUILT ENVIRONMENT

Parker Ruskamp

Department of Landscape Architecture/Regional and Community Planning; College of Architecture, Planning, and Design

BACKGROUND: The physical environment influences mental health and inevitably well-being. While exposure to natural environments shows positive health benefits among those who maintain a consistent connection, little is known about how urban environments impact mental health. As urbanization increases worldwide, it is essential to understand the linkages between this environment and public health. This project is guided by the research question: How do different environmental characteristics affect stress-related responses in users? **METHOD:** The study will guide individual subjects ($n > 30$) to walk a designated urban route, exposing them to different architectural and environmental elements in downtown Manhattan, Kansas. Physiological biofeedback sensors, including electrodermal activity (EDR) and heart rate equipment, will be used monitor stress; GPS will provide spatial location; and a GoPro camera will provide real-time first-person experience. Data from these sensors will be integrated into a temporal-spatial analysis to ascertain correlations between architectural and environmental elements in space and associated stress responses. **ANTICIPATED OUTCOMES:** The analysis will be mapped to visualize the associations between design characteristics and the elicited stress responses in order to determine the environmental characteristics that illicit heightened stress responses. **CONCLUSION:** The intent of the research is to provide a foundation for further studies into how public policy can be better informed and augmented to mitigate potential public health issues caused by urban design. Results will also inform architectural and engineering decision-making to further improve urban design by identifying characteristics that improve or decrease mental health of urban environments.

SPEAKING OUT: TRANSACTING THE SILENCE IN *SPEAK* AND AMERICAN RAPE CULTURE

Domeniqué N. Bernett

Department of English, College of Arts and Sciences

CRITICAL CONVERSATION: Critics of Laurie Halse Anderson's young adult novel *Speak* (1999) have analyzed the protagonist Melinda's voicelessness and explained her silence through individual critical lenses of feminine oppression, queer studies, young adult experiences or trauma. **THESIS:** Melinda's silence may seemingly be in response to the oppressive act of rape, but using a feminist textual analysis I assert that her silence is also a result of the lack of appropriate discussion surrounding rape in the United States. **SUBCLAIMS:** Melinda's own struggle to define her rape demonstrates the lack of education surrounding sexual relationships and consent. Her attempts to talk specifically about her rape are repeatedly shut down or controlled by other people's responses, indicating our society's inadequate education and tabooed discussion of rape. *Speak* also reveals some of the ways society reinforces gender norms to excuse unacceptable behaviors that perpetuate and condone rape. Creative writing, graffiti and visual art allow Melinda to eventually speak out about her rape. These alternative modes of expression are not only instrumental in Melinda's own recovery, but they also prompt others to begin discussing rape. **SIGNIFICANCE:** By recognizing Melinda's voicelessness as a product of the assault itself and society's rape culture, *Speak* thus acknowledges the lack of discussion and education for young adults about healthy sexual choices in our society, and calls for an end to our damaging rape culture. In doing so, *Speak* itself thus becomes another alternative form of expression that allows young readers to navigate this difficult topic.

THE VIOLENCE, CRIME, AND ODDITIES OF JUNCTION CITY, KANSAS AND HOW IT RELATES TO THE DEVELOPMENT OF TOOFLADY

Thea Meussling

Department of Art, College of Arts and Sciences

BACKGROUND AND PURPOSE: In this presentation, I discuss the development of and goals for my performance character, Tooflady, who is still under construction when it comes to her background and personal depth. I directly connect the continuous growth of Tooflady to the main source of research I gathered for this presentation. **METHOD:** On November 14, 2015, I conducted an interview with 4 men inquiring about their personal experiences with Junction City, Kansas. When interviewing these men, I asked a few basic questions followed by more questions to seek additional details from their stories. The interviewees have been bound by a contract to keep their identities anonymous. Instead, they are labeled by their age, occupation, where they were born, and how long they have been in the Geary County/Riley County area. I have also taken information from various newspaper articles that reported on the darker times in Junction City and Manhattan. **RESULTS/FINDINGS:** During these interviews, I discovered that there was a huge rivalry between Junction City, Manhattan, and the soldiers of Fort Riley in the 60s, 70s, and 80s. **CONCLUSION:** In my presentation, I discuss these rivalries, present portions of the interview, and use historical information to confirm their statements. I plan on continuing this type of research to obtain more colorful stories to aid in the enrichment of Tooflady's depth as a performance character.

IMPOSTER SYNDROME: SOCIAL IDENTITY CONSTRUCTION OF FIRST-GENERATION STUDENTS AT A FOUR-YEAR UNIVERSITY

Miranda B. Klugesherz

Department of Communication Studies, College of Arts and Sciences

BACKGROUND AND PURPOSE: First-generation college students (FGCS) are among the nation's quickest rising population of students. However, with low student persistence, first-generation students are suspected to suffer from "imposter syndrome," otherwise known as the inability to feel "good enough" (Byrd & MacDonald, 2005, p.31) to be in college. **METHOD:** Grounded in social identity theory, this study explores how first-generation college students construct and communicate their identity as a student as it relates to their first-generation status. **RESULTS:** Results suggest that participants, regardless of prior college preparation, positively identified with their university and exhibited low levels of imposter syndrome. However, a significant difference did emerge in factors impacting the creation of the college student identity for the two groups. **CONCLUSION:** Results of this study suggest that the high drop-out rate of first-generation students (National Center for Education Statistics, 2005) could be explained by the simple fact that these students do not conceptualize the value of college in the same way as legacy students. By giving them a reason to persist outside of grades, universities can help to further the success of the first-generation student population. Therefore, theoretical implications are discussed regarding stigma management of the first-generation status, as well as practical implications suggesting the development of university programs tailored to fit the nuanced needs of first-generation college students.

GLOBAL POTENTIAL OF ETHANOL INDUSTRY CO-PRODUCT: DISTILLERS DRIED GRAINS WITH SOLUBLES (DDGS) AS A DIETARY SUPPLEMENT

Rajesh Kumar, Kaliramesh Siliveru, Cameron McGuire, JungEun Lee, and Sajid Alavi

Department of Grain Science and Industry, College of Agriculture

BACKGROUND: The worldwide surge in ethanol industry has increased the production of its co-products such as distillers dried grains with solubles (DDGS). Limited research work has hindered the potential use of high nutritional value DDGS in human food. **PURPOSE:** A study was conducted to evaluate the prospective of DDGS incorporation as a dietary supplement by developing puffed-snack using extrusion processing. **METHOD:** Industrial scale single screw extruder was used to process the mixture of cornmeal and two types of DDGS (regular DDGS containing 8.85% fat and low-oil DDGS containing 4.51% fat). Three levels of DDGS, different particle size of DDGS were applied to produce eight types of snack. Flow properties of raw mixes were determined by phase transition analysis, and macro-structural parameters of extrudates, oil uptake and consumer acceptance studies for different formulations were carried out. **RESULTS:** Increased levels of regular DDGS significantly reduced the oil uptake of extrudates during deep-fat frying. However, the oil uptake was increased with low oil DDGS. A decreasing trend in melting point and expansion ratio values were observed with increase concentration of DDGS. Extrudates with 10% regular DDGS was moderately liked in terms of overall acceptability, and was almost close to control sample in all other sensory attributes. **CONCLUSION:** Based on results it was concluded that DDGS is a rich source of protein that can be used as a dietary supplement in extruded products, and also very useful in reducing oil absorption of extrudates. Thus, ethanol industry co-product DDGS can be utilized as valuable material for food industry.

EFFECTS OF FEEDING MICROALGAE MEAL (*SCHIZOCHYTRIUM LIMACINUM* CCAP 4087/2) TO BEEF HEIFERS ON FRESH MEAT QUALITY

Kelsey J. Phelps¹, James S. Drouillard¹, Kate Jacques², T. G. O'Quinn¹, Mathew A. Vaughn¹, and John M. Gonzalez¹

¹*Department of Animal Sciences and Industry, College of Agriculture;* ²*Alltech Inc., Nicholasville, KY*

BACKGROUND AND PURPOSE: Intake of saturated fat has been a health concern for nearly 60 years. Beef naturally has more saturated fats than health beneficial omega-3 fats typically found in fish. Research has focused on manipulating the fatty acid profile of beef to increase omega-3s. The objective of this research was to evaluate the effects of feeding microalgae meal (MA) to beef heifers on fatty acid profile and fresh beef quality. **METHOD:** Heifers housed in 36 pens, fed a typical finishing diet, were assigned to four treatments: 0, 50, 100 or 150 g/day MA supplementation (Alltech, Inc.). Heifers were harvested on day-89 of the study and loins were collected from 3 heifers per pen, weighed, vacuum-packaged, and aged 14 days. Loins were reweighed and fabricated into 2.54-cm thick steaks for analysis of fatty acids, lipid oxidation, color-stability, objective tenderness, and sensory attributes. **RESULTS/FINDINGS:** Feeding MA increased C20:5n3, C22:5n3, and C22:6n3 omega-3 fatty acids. Throughout the display period, increasing MA in the diet decreased steaks redness and increased surface discoloration through the appearance of more metmyoglobin. Increasing MA elevated lipid oxidation on day 0 and 7 of display. Increasing MA, did not affect purge loss, cook loss, or objective tenderness, but increased sensory panel "fishy" and "oxidized" off-flavors. **CONCLUSION:** While increasing MA in the diet of finishing heifers increases the content of healthy omega-3 fatty acids, MA negatively affects steak color-stability and off-flavor. Future studies utilizing this MA product should focus on altering the antioxidant content of the diet to prevent off-flavors and reductions in color stability.

INVESTIGATION OF SOLUBLE AND INSOLUBLE FIBERS FOR PHYSICOCHEMICAL, RHEOLOGICAL AND THERMOMECHANICAL PROPERTIES

Chetan Sharma, Qingbin Guo, and Sajid Alavi

Department of Grain Science and Industry, College of Agriculture

BACKGROUND AND PURPOSE: The inclusion of dietary fibers into food matrix has been widely reported due to its potential health benefits. Extrusion processing continually increasing attention as it has huge potential to deliver fiber enriched products such as breakfast cereals and expanded snacks. Previous researchs were mainly focused on the optimization of the extrusion conditions and formulation to improve product texture and overall acceptability, whereas the relationship between the molecular structure and extrudate characteristics such as expansion, air cell size and water solubility (bowl life) has yet been established. **METHOD:** Blends of insoluble (Cellulose and lignin), soluble (Pectin) and natural fiber sources (Tomato pomace and sugar beet fiber) were prepared with replacement of corn flour and evaluated for physicochemical (water holding), dynamic rheological, pasting (RVA) and thermal properties (PTA). **RESULTS AND CONCLUSION:** Pectin showed higher water holding capacity compared with other fibers. From RVA, higher peak viscosity, breakdown and setback values were observed for insoluble fiber blends (cellulose) as compared to soluble fiber blend (pectin and corn flour). Storage modulus (G') was higher for cellulose but an increase with increasing frequency was significant with pectin. Lowest loss modulus (G'') value were observed with pectin. The addition of moisture significantly reduced both softening (T_s) and flow temperature (T_f), irrespective of type of fibers. The effect of concentration of fibers was significant on softening and flow temperature. Soluble fibers due to higher water holding capacity, lower value for setback and G'' suggested better expansion and linear viscoelastic properties as compared to insoluble fibers.

ASSESSMENT OF HESSIAN FLY, *MAYETIOLA DESTRUCTOR* (DIPTERA: CECIDOMYIIDAE), ATTRACTION TO VISUAL AND OLFACTORY CUES IN Y-TUBE OLFACTOMETERS

Ryan B. Schmid^{1,2}, Darren Snyder^{1,3}, Lee W. Cohnstaedt^{1,3}, and Brian P. McCornack^{1,2}

¹Department of Entomology, College of Agriculture; ²Plant Biosecurity Cooperative Research Centre, Bruce, ACT, AU, ³USDA-ARS, Manhattan, KS

BACKGROUND AND PURPOSE: The Hessian fly, *Mayetiola destructor* (Say) (Diptera: Cecidomyiidae), is historically the number one wheat pest around the world. Cost effective and efficient monitoring strategies are essential for early detection and implementation of management methods. However, the existing monitoring strategy (utilizing the Hessian fly female sex-pheromone), while effective, does not attract female Hessian flies. This is problematic, as monitoring of female adults is key to assessing the severity of new invasions and incorporating trap captures into management decisions. Recent research has shown female Hessian flies are attracted to green light emitting diodes (LEDs) (~525 nm) at high intensities (16 W/m²). The purpose of this study was to examine the attraction of both sexes of Hessian fly to combinations of visual and olfactory attractants. **METHOD:** Hessian fly attraction to LEDs (525 nm, 16 W/m²) and female sex pheromone was tested in Y-tube olfactometer bioassays (n = 8 reps; n = 10 flies/rep). All combinations of LED and pheromone were tested on each sex separately to examine potential interactions between attractants with either sex of fly. **RESULTS/FINDINGS:** Both male and female Hessian flies chose green LEDs significantly more than the female sex pheromone. Also, no negative interactions were observed for either sex. **CONCLUSION:** The results validate the potential for LEDs in conjunction with female sex pheromone to improve existing trap captures of both Hessian fly sexes. Ultimately the incorporation of our findings into new Hessian fly trap designs will help to achieve our goal of improving surveillance effectiveness for both sexes of Hessian fly.

DETERMINATION OF THE EFFECT OF BRAND AND PRODUCT IDENTIFICATION ON CONSUMER PALATABILITY RATINGS OF GROUND BEEF PATTIES

Alaena Wilfong, Kassandra McKillip, John Gonzales, Terry Houser, Elizabeth Boyle, John Unruh, and Travis O'Quinn

Department of Animal Sciences and Industry, College of Agriculture

BACKGROUND AND PURPOSE: Ground beef represents the most popular beef item for consumers when preparing meals in their home (NCBA, 2012). To date, little research has evaluated ground beef palatability despite its popularity. The objective of this study was to determine the effect of brand and product identification on consumer palatability ratings of ground beef patties. **METHOD:** Six ground beef treatments (6, 10lb-chubs/treatment) that included 90/10 Certified Angus Beef (CAB) ground sirloin, 90/10 commodity, 80/20 CAB ground chuck, 80/20 commodity ground chuck, 80/20 commodity, and 73/27 CAB ground beef were evaluated. Each sample was evaluated on 100-point scales for tenderness, juiciness, flavor, texture, and overall liking in two rounds. During the first round, consumers were not informed of extra purchasing information; however, in the second round of testing, product type, and brand were disclosed prior to evaluation. **RESULTS/FINDINGS:** Few differences were seen among all treatments when evaluated blind; however, consumer ratings increased ($P < 0.05$) all traits evaluated for CAB products when informed of the brand. Brand disclosure increased ($P < 0.05$) perception of tenderness by 17%, juiciness by 31%, flavor by 21%, texture by 16%, and overall liking by 22% for 90/10 CAB ground sirloin samples. Conversely, 80/20 commodity ground beef and 80/20 commodity ground chuck were perceived to be less ($P < 0.05$) tender and have a reduced ($P < 0.05$) flavor liking after product type was disclosed. **CONCLUSION:** These results indicate that branding and product awareness have a large effect on consumer perception of ground beef palatability.

EFFECT OF METHOPRENE IMPREGNATED POLYMER PACKAGING ON THE DEVELOPMENT OF *TRIBOLIUM CASTANEUM* AND *TROGODERMA VARIABLE*

Deanna Scheff¹, Bhadriraju Subramanyam¹, Frank Arthur², and Hulya Dogan¹,

¹Dept of Grain Science and Industry, College of Agriculture; ²USDA –Center for Grain and Animal Health Research, Manhattan, KS

BACKGROUND AND PURPOSE: Methoprene is an insect growth regulator which can be impregnated into a polymer based packaging to prevent insect infestations. The objectives of this study were to evaluate the lethal and sub-lethal effects when eggs of *Tribolium castaneum* and *Trogoderma variabile* were exposed to ethylene-to-polyethylene (PE-PE) and polyethylene terephthalate-to-polyethylene (PET-PE) packaging, at 27 and 32°C and 60% r.h. **METHOD:** Packaging materials were and fitted into 62 cm² Petri dishes (arenas) along with 500mg of diet. The effect on adult fecundity was determined by exposing ten mixed sex adults of *T. castaneum* for seven days and *T. variabile* for three days, before removal. The number of eggs laid/female and hatchability was determined. The effect on egg-to-adult development was determined by exposing ten mixed sex adults on the packaging surfaces, allowing them to oviposit, followed by adult removal. Arenas were monitored for normal adult emergence. **RESULTS/FINDINGS:** Polymer packaging reduced the percent hatchability of both species. There was 100% suppression of adult emergence of *T. castaneum* from eggs exposed at both temperatures and surfaces of the PE-PE packaging. Only the inside surface of PET-PE packaging resulted in 100% suppression. *T. variabile* progeny developed into pupae-adult intermediates at both temperatures on the outside surface of PE-PE packaging. There was little effect on the inside surface, as opposed to the PET-PE packaging reduced the number of normal adults on the inside surfaces. **CONCLUSION:** Methoprene packaging can be used as a preventative method to control for stored-product insects on a wide variety of products such as birdseed or granola packages.

ENHANCEMENT EFFECTS ON CONSUMER ACCEPTABILITY OF BEEF STRIP LOIN STEAKS

Kassandra McKillip, Alaena Wilfong, John Gonzalez, Terry Houser, Elizabeth Boyle, John Unruh, and
Travis O'Quinn

Department of Animal Sciences and Industry, College of Agriculture

BACKGROUND AND PURPOSE: Increased marbling level and enhancement of beef with water, salt, and alkaline phosphates have been consistently reported as improving consumer palatability ratings of juiciness, tenderness, flavor liking, and overall liking. The objective of this study was to determine if the effect of enhancement and marbling level are independent or additive on beef palatability traits. **METHOD:** Beef strip loins (n=72) were selected to equally represent three USDA quality grades: Prime, Low Choice, and Low Select. Half (n=12) of the strip loins within each quality grade were enhanced to 108% raw weight with a salt, alkaline phosphate, and water solution. Steaks were cooked to three different degrees of doneness (Rare 60°C; Medium 71°C; Very Well-Done 82°C). Consumer panelists (n=252) rated samples for juiciness, tenderness, flavor liking and overall liking on 100mm line scale, with verbal anchors at ends and midpoints. **RESULTS/FINDINGS:** All enhanced treatments, regardless of quality grade, were similar ($P<0.05$) for all palatability traits evaluated. Additionally, enhanced treatments had greater ($P<0.05$) ratings of juiciness, tenderness, flavor liking, and overall liking than all non-enhanced treatments. When evaluating consumer ratings for steaks differing by DOD, juiciness, tenderness, and overall liking scores increased ($P<0.05$) as DOD decreased (Rare>Medium>Very Well-Done). **CONCLUSION:** These results indicate there is no additive effect between enhancement and quality grade on palatability. As a result, industry should continue utilizing lower quality grades for enhancement.

USING SEALED BINS TO ENSURE SUCCESSFUL GRAIN FUMIGATIONS

Sam Cook¹ and Dirk Maier²

¹Department of Grain Science and Industry, College of Agriculture; ²Department of Agricultural and Biosystems Engineering, Iowa State University

BACKGROUND AND PURPOSE: Cereal grains like wheat and corn are often stored in large bulk bins. The primary goal during storage is maintaining the quality of the grain. Among major threats to quality are insect infestations that can destroy grain and lead to “hot spots” that further compromise grain quality. Insects can be controlled in grain bins using fumigants such as phosphine, provided the bins are well sealed. Fumigating in poorly sealed bins has been cited as the main reason for phosphine resistance in common grain pests found in grain bins in the U.S. A sealed bin keeps the fumigant within the grain mass long enough to achieve a complete kill of insects, preventing populations of resistant insects from developing. Grain bins in the United States are not typically designed to be readily sealed for fumigations. We investigated the suitability of using sealed bins for grain storage in the U.S. **METHOD:** We erected a typical U.S. corrugated steel grain bin and sealed it during construction. It was fitted with fumigant application and recirculation equipment, and monitoring lines to determine fumigant concentration inside the grain mass during the fumigation. Using a sealed bin from Australia as a benchmark, we conducted three fumigations, measuring the fumigation levels over 1-week periods. **RESULTS/FINDINGS:** In all three fumigations, phosphine levels were sufficiently high to achieve a complete kill of common stored grain insects. **CONCLUSION:** Sealed grain storage helps ensure successful grain fumigations. It is a technology that U.S. grain bin manufacturers would do well to look into.

STUDENTS' WRITTEN SOLUTIONS REFLECT VARIED SOLUTION SCHEMATA

Nandana Weliweriya, Deepa Chari, Dean Zollman, and Eleanor Sayre

Department of Physics, College of Arts and Sciences

BACKGROUND AND PURPOSE: As a part of the Mathematization project, we investigate how intermediate mechanics and Electromagnetic Field 1 students use mathematical tools in their homework problems. We use their homework solutions to build a “fingerprint” of students’ use of mathematical tools. Most of the physics problems are represented by words may be along with a diagram. In order to start the solving process, it’s required to convert the worded problem into a mathematical representation. Then algebra, calculus, a calculator and/or a computer could be employed to solve the problem. We can use the term ‘*mathematization*’ to represent this conversion associated with physics problems. **METHOD:** We use the modified version of the ACER framework to analyze student’s solutions. We code their homework solutions as to which problem solving tool they use at each step, then generalize across students and problems to build patterns. To compare patterns, we use techniques borrowed from social network analysis. **RESULTS/FINDINGS:** We found frequently occurring codes and code pairs and mapped them to different pathways of solving the same problem using social network analysis. The most common codes and code pairs relate to students' evaluation of mathematical expressions, followed by their identification of which general cases to use. Results are highly dependent on the exact wording of the homework problems. **CONCLUSION:** This kind of analysis is new in studies of students' problem solving, particularly at the university level and beyond. Our work shows that it is both possible and fruitful, and pushes theoretical and methodological developments in understanding students' problem solving.

A NOVEL APPROACH TO CONVERT METALLIC SILVER DIRECTLY INTO SILVER NANOPARTICLES

Asanka S. Yapa¹, Emily McLaurin¹, Christopher Sorensen², and Stefan H. Bossmann¹

¹*Department of Chemistry, College of Arts and Sciences;* ²*Department of Physics, College of Arts and Sciences*

BACKGROUND AND PURPOSE: Due to their antibacterial, catalytic, optical and conductive properties, silver nanoparticles (AgNPs) have been using in various technologies and a wide range of consumer products. Growing demand for these nano-sized silver particles requires efficient and cost-effective production which is a challenging task for industry. Against this background, we invented a new, convenient method to synthesize AgNPs directly from bulk silver under microwave heating. **METHOD:** Silver powder, triethylphosphite ligand (L) and acetonitrile solvent were reacted in a microwave reactor. The resulting nanoparticle solution was separated from un-reacted bulk by means of centrifugation. AgNPs were characterized by UV/VIS spectroscopy, Transmission Electron Microscopy (TEM) and Dynamic Light Scattering (DLS). After optimizing reaction parameters, a kinetic study was performed to understand the paradigm of the process. Furthermore, the residue after one reaction was subjected to consecutive runs. **RESULTS/FINDINGS:** From this one-pot, microwave-assisted reaction, monodispersed nanoparticles (~ 25 nm) can be obtained within an hour and unreacted Ag can be used for back-to-back runs. The basic unit of dissolution was identified as AgL_2 by ESI-MS. These ligand-stabilized Ag atoms aggregate to form AgNPs. **CONCLUSION:** Herein we report the first example of single-step AgNP synthesis directly from metallic Ag. The use of MW radiation to heat the reaction mixture makes this process much greener while providing several other desirable features such as faster and uniform heating, shorter reaction time, low energy consumption and higher reproducibility. The use of relatively inexpensive and safe solvent, ligand and metallic silver leads to cost effective production with minimal environmental impact.

ALGORITHMIC, CONCEPTUAL, PHYSICAL THINKING AND PHYSICAL MATH: A FRAMEWORK FOR UNDERSTANDING STUDENT DIFFICULTIES IN QUANTUM MECHANICS

Bahar Modir, John D. Thompson, and Eleanor C. Sayre

Department of Physics, College of Arts and Sciences

BACKGROUND AND PURPOSE: Students generally have enough understanding of mathematics to solve introductory quantum mechanics problems, but in practice they frequently have considerable difficulty applying that understanding appropriately. “Epistemological frames” reveal students’ ways of thinking and expectations, that they utilize to solve problems. Researchers in student understanding of quantum mechanics have used a “difficulties” framework to understand student reasoning, but we believe that these disparate difficulties can be unified through examining students’ epistemological framing. We use a two-axis framing to understand students’ problem solving, focusing on four frames: algorithmic math, conceptual math, physical systems, and physical math. **Method:** We collected video data from one semester of a senior-level undergraduate quantum mechanics course. Careful observation of students’ discourse of in-class group problem solving can provide clues for determining students’ epistemological frameworks. **RESULTS/FINDINGS:** By characterization of each frame we identify students’ frames and the time they spend in each frame. Once we find students’ frames, we look for shifts in frames to help us to interpret the dynamic of students’ problem solving behaviors or identify the impasse students reach when they fail to notice certain factors that could have triggered a shift to a more appropriate state. **CONCLUSION:** We will discuss that students’ difficulties in quantum mechanics may simply be the result of unproductive framing as well as failure to switch between frames and not fundamental inability to solve these problems. Finally, we will discuss the implications of application of our framework in analysis and unifying findings on student difficulties from other published works.

DEVELOP LIGNIN-PROTEIN BASED ADHESIVE

Sarocho Pradyawong, Guangyan Qi, and Donghai Wang

Department of Biological and Agricultural Engineering, College of Engineering

BACKGROUND AND PURPOSE: About 8 billion pounds of petroleum-based adhesives are used in wood-based industries. Phenol formaldehyde-based adhesives provides high adhesion strength and water resistance. However, it is toxic to humans and causes environmental pollution. Nowadays, there are significant concerns about health and the environment. There are also strong demands for safe and environment friendly adhesives. Soy protein-based adhesives (SPA) have been commercially available for partial replacement of urea formaldehyde-based adhesives. However, water resistance of SPA does not compete with to phenol formaldehyde adhesives for exterior applications. Lignin, the most abundant aromatic polymer, is largely available as industrial co-products from paper and biofuel production. Basic subunits, are building blocks for many polymers, which are currently obtained from fossil-based feedstocks. Lignin is more hydrophobic and protein is more hydrophilic. Therefore, bio-based adhesives derived from principal components of lignin and plant proteins could improve water resistance. The objective of this research is to develop lignin-protein-based adhesive with improve water resistance. **METHOD:** Different particle sizes of lignin are used to make lignin-protein adhesive at various concentrations and ratios. **RESULT AND CONCLUSION:** The lignin-soy protein adhesive demonstrated different viscosity and contact angle profiles in comparison to the control soy protein. The thermal property of all lignin-soy protein conditions are higher than that of control adhesive. Wet strength of lignin-soy protein adhesive increased with decreasing lignin particle size. The highest wet strength was observed at soy protein to lignin ratio of 10 to 2 and pH of 4.5.

ANTIMICROBIAL RESISTANCE IN DIRECT-FED MICROBIALS USED IN CATTLE

Felicia Giok, Deepti Pillai, Greg Peterson, and Sanjeev Narayanan

Department of Diagnostic Medicine and Pathobiology, College of Veterinary Medicine

BACKGROUND AND PURPOSE: Usage of antimicrobials in animal feed has come under increasing scrutiny from the public and regulatory agencies. Direct-fed microbial (DFM) or probiotics are considered valuable alternatives to antimicrobials in food animal nutrition. They are live organisms, when given orally, have proven beneficial in improving gut microbial balance. Studies in Europe have reported antimicrobial resistance (AMR) in DFM organisms, due to their potential for transferring resistance to pathogenic bacteria in the gut. The aim of the present study is characterizing phenotypic and genotypic AMR profiles of bacterial strains isolated from 10 commercially available DFM used in cattle to 20 different antimicrobials. **METHODS:** Disc diffusion and broth micro-dilution based assay (MIC) were performed to determine phenotypic AMR. Spotted DNA microarray was used to detect resistance genes in DFM. **RESULTS/FINDINGS:** Our results include *Enterococcus faecium* isolates showing resistance towards metronidazole (n=9), erythromycin (n=3), rifampin (n=8), and clindamycin (n=5). A *Propionibacterium freudenreichii* isolate showed resistance towards kanamycin and levofloxacin. A *Lactobacillus plantarum* isolate showed no inhibition zone for vancomycin, ciprofloxacin and metronidazole. An isolate of *Bacillus subtilis* showed resistance towards clindamycin, erythromycin and chloramphenicol. Microarray analysis revealed several resistance genes in *E. faecium* strains from 3 different DFMs: Strain 1 carried an aminoglycoside, erythromycin and three tetracycline resistance genes; Strain 2 carried a beta-lactam and two tetracycline resistance genes; Strain 3 carried an erythromycin and a tetracycline resistance gene. **CONCLUSION:** These studies show that AMR is prevalent among probiotic bacteria used in cattle industry in the U.S., and justifies further characterization and detection of such resistance.

MICROBIAL LIPID PRODUCTION FROM LIGNOCELLULOSIC BIOMASS USING ROBUST OLEAGINOUS YEASTS

Jungeun Lee¹, Yadhu N. Guragain¹, and Praveen V. Vadlani^{1, 2}

¹Department of Grain Science and Industry, College of Agriculture; ²Department of Chemical Engineering, College of Engineering

BACKGROUND AND PURPOSE: Microbial lipids produced from lignocellulosic biomass are promising biodiesel source due to their sustainability and environmental safety. Especially, oleaginous yeasts are robust microorganism that effectively accumulate lipids (mainly, triacylglycerides) inside cell using lignocellulosic biomass hydrolysates. While producing lignocellulosic biomass hydrolysates via pretreatment and enzymatic hydrolysis, many toxic compounds are generated, and they inhibit yeast growth and lipid production during fermentation process. Therefore, it is important to select robust oleaginous yeasts that have high intolerance to pretreated-induced inhibitors and utilize diverse monomer sugars (glucose, xylose, and arabinose) derived from lignocellulosic biomass. **METHOD:** In this study, three oleaginous yeasts (*Cryptococcus albidus*, *Lipomyces starkeyi* and *Trichosporon oleaginosus*) were utilized to optimize lipid production from sorghum stalk hydrolysates. First of all, ground sorghum stalk was pretreated with diluted sodium hydroxide solution, and then hydrolyzed using commercial enzyme to produce monomer sugars in a 5L bioreactor for 60hours. Each oleaginous yeast was cultivated in 30mL of sorghum stalk hydrolysates for 5days. **RESULTS AND CONCLUSION:** *T. oleaginosus* accumulated about 60% of lipids (w/w of cell dry weight), and produced total 6.2g/L of lipids at 120h fermentation. Whereas, *L. starkeyi* and *C.albidus* accumulated about 40% of lipids (w/w of cell dry weight), and produced total 4g/L of lipids. Our study demonstrated that *T. oleaginosus* was the most appropriate microbial system for production of lipids from sorghum stalk hydrolysates.

SPATIO-TEMPORAL DYNAMICS OF JUNIPER ENCROACHMENT IN OAK WOODLANDS

Pabodha Galgamuwa G.A.¹, Charles Barden¹, and Jida Wang²

¹Department of Horticulture, Forestry & Recreation Resources, College of Agriculture; ²Department of Geography, College of Arts and Sciences

BACKGROUND AND PURPOSE North America's midcontinent forest-prairie ecotone is currently exhibiting an extensive eastern redcedar (ERC) (*Juniperus virginiana*) encroachment. It continues to expand in area and density particularly in Missouri, Nebraska, Kansas and Oklahoma, and drives major alterations in species composition and forest structure suppressing previous dominant oak (*Quercus*) species. In Kansas, the growing-stock volume of ERC increased by 15,000% between 1965 and 2010. Prescribed burning essentially is the most viable option for ensuring the regeneration and maintenance of fire-dependent species in a cost-effective manner. Quantifying where ERC expansion is occurring is essential for land managers to plan and manage control efforts. Objective of this study is to evaluate spatio-temporal dynamics of ERC expansion in northeast Kansas oak woodlands and identify where prescribed fire is a viable treatment. **METHOD** Two mosaics of Landsat satellite images covering the study area within the same year were fused to create one image per every 2-3 years using images acquired by Landsat TM, ETM+, and OLI sensors for the period of 1990-2016. Support Vector Machines (SVM), a supervised non-parametric classifier is used to classify each image to identify ERC and other major cover types. The classified images are used to assess spatio-temporal dynamics of ERC encroachment. **RESULTS AND CONCLUSION** Pilot study conducted around Tuttle Creek Lake revealed an expansion of area under ERC by 7800 acres between 1995 and 2015, with the majority of the expansion occurring on previous agricultural lands and associated grasslands. Similar results are anticipated for the entire study region.

CHARACTERIZATION AND MECHANISTIC INVESTIGATION OF DYE DECOLORIZING PEROXIDASE (DYP) FROM THERMOMONOSPORA CURVATA AND ENTEROBACTER LIGNOLYTICUS

Ruben Shrestha, Chao Chen, and Ping Li

Department of Chemistry, College of Arts and Science

BACKGROUND AND PURPOSE: Enzymatic depolymerization has been sought as a preferred way to degrade lignin, which is the bottleneck for the production of biofuels. Dye decolorizing peroxidase (DyP) is a heme peroxidase that was recently found to exhibit ligninolytic activity together with its capability of decolorizing dyes. It uses hydrogen peroxide as an oxidant to form high valence iron intermediates that can oxidize various substrates. Here, we report the discovery and biochemical study of DyPs from *Thermomonospora curvata* (*TcDyP*, A-class) and *Enterobacter lignolyticus* (*ElDyP*, B-class). **METHOD:** Recombinant *TcDyP* and *ElDyP* enzymes were cloned, purified, and characterized by various biochemical tools. Site-directed mutagenesis and steady-state kinetics were used to identify the catalytic residues. Stopped-flow spectrophotometry was employed to reveal the transient kinetics of the reactions catalyzed by DyPs. Enzyme redox potentials were determined by spectroelectrochemical titrations. **RESULTS:** For *TcDyP*, residues Asp220 and Arg327 were catalytically important for the formation of key intermediate, compound I. The rate constants of each step in the catalytic cycle were determined. His312 and Arg327 were found to affect oligomerization states and redox potentials of the enzyme. For *ElDyP*, Asp143, Arg232 and His215 were established as catalytic residues. His215 was found to be essential for heme co-factor binding. Both enzymes were found to degrade phenolic lignin dimer model compounds and display pH-dependent catalase activity. **CONCLUSION:** This study not only helps to understand the DyP molecular mechanism that is still unknown, but also facilitates to realize its potential biotechnological applications in biofuel production.

THE IMPACT OF OIL COMPOSITION ON EMULSION FORMATION AND STABILITY

Yulia Burakova¹, Jishu Shi², and John Schlup¹

¹Department of Chemical Engineering, College of Engineering; ²Department of Anatomy and Physiology, College of Veterinary Medicine

BACKGROUND AND PURPOSE: Self-emulsifying emulsions are appealing candidates for animal vaccine adjuvants because of easy preparation and low-energy consumption. This type of emulsification is very dependent on a number of factors, not the least of which is the chemical nature of the oil. Medium chain triglycerides (MCT) and long chain triglycerides (LCT) are good candidates for self-emulsification systems, while non-polar oils, such as paraffin oil, typically require high energy mixing to form emulsions. In this study, triglycerides were mixed with paraffin oil, and their effectiveness in forming self-emulsifying emulsions upon their addition to water was investigated. **METHOD:** A dynamic light scattering technique measured droplet size and polydispersity index. The zeta potential for these systems was characterized as a function of the oil phase composition. In addition, the dependence of emulsion stability on oil phase composition at different storage conditions was studied. **RESULTS/FINDINGS:** When oil phase was comprised of paraffin oil and either a MCT or LCT, droplet sizes on the order of 50 nm were obtained. The stability of these emulsions exhibited similar trends as a function of the triglyceride/paraffin oil composition. When a short chain triglyceride (tributylin) was employed, the smallest droplet size observed was 705 nm, and the resulting emulsions were very unstable. **CONCLUSION:** Our studies demonstrate that, by modification of the oil composition, we can control the emulsion stability and droplet size. This is a first step in developing of engineering approach to designing emulsion-based adjuvants with controlled droplet size and stability profiles for improved vaccine performance.

STRUCTURES OF PEPTIDE NANOVESICLES FOR CANCER THERAPY

Nilusha Kariyawasam, Stefan H. Bossmann, and Paul E. Smith

Department of Chemistry, College of Arts and Sciences

BACKGROUND AND PURPOSE: Studying the self-assembly of peptides into nanovesicles is an interesting field of research due to their potential applications in the pharmaceutical industry. Experimentally, equimolar mixture of (cholesterol-(L)₂₀DEV DGC)₃-trimaleimide (L-lysine) and (cholesterol-(D)₂₀DEV DGC)₃-trimaleimide (D-aspartic acid) building blocks have been shown to form nanovesicles which can be used to deliver drugs to a tumor site. The main purpose of this research is to investigate the structure and the aggregation mechanism of these building blocks in aqueous solution using computer simulation studies. **METHOD:** We use both the atomistic and coarse grained simulation methods to study the aggregation behaviour of the two building blocks. **RESULTS/FINDINGS:** Interestingly, after simulation we were able to observe aggregated structures for (cholesterol-(L)₂₀DEV DGC)₃-trimaleimide in agreement with experimental results. Moreover, there were specific stacking interactions between cholesterol molecules which drive the self-assembling of (cholesterol-(L)₂₀DEV DGC)₃-trimaleimide blocks. Furthermore, in an equimolar mixture the building blocks were aggregated together via cholesterol molecules to form nanosized micro clusters. The pores are consistent with the encapsulation of hydrophobic drugs or proteins. **CONCLUSION:** With the realistic computer models generated here, we will be able to modify more sequences to generate more biocompatible and bioavailable nanostructures which can be used to transport drugs to treat tumor cells.

HOUSEHOLD FOOD INSECURITY ACCESS PREVALENCE (HFIAP) AS PREDICTOR OF STUNTED CHILD AND OVERWEIGHT/OBESE MOTHER (SCOWT) IN URBAN INDONESIA

Trias Mahmudiono^{1,2}, Dini Andrias², Triska Nindya², Hario Megatsari³, and Richard Rosenkranz¹

¹Department of Human Nutrition, College of Human Ecology; ²Department of Nutrition; ³Department of Health Promotion and Education – Faculty of Public Health, Universitas Airlangga - Indonesia

BACKGROUND AND PURPOSE: Food insecurity exists whenever the availability of nutritionally adequate, safe foods, or access to attain basic foods in socially acceptable ways is compromised. This study aimed to determine the relationship between household food insecurity and double burden of malnutrition as indicated by household stunted child and overweight/obese mother (SCOWT). **METHOD:** The household food insecurity access prevalence (HFIAP) is a categorical indicator of food insecurity status. Stunting was defined as <-2.0 height-for-age Z-score (HAZ) by WHO-Anthro 2005. Maternal overweight was defined as BMI >25.0 to 30.0 and obesity was defined as BMI >30.0 . This cross-sectional study involved 685 households with children under five years old, in urban Indonesia. Logistic regression models were constructed to test the association between HFIAP and SCOWT. **RESULTS/FINDINGS:** The prevalence of child stunting was 36.5%, maternal overweight/obesity was 58.8%, and SCOWT was 21.2%. Although many households (42%) were food secure, there were high proportions of mild (22.9%), moderate (15.3%) and severe (19.7%) food insecurity. The logistic regression models revealed a significant association between HFIAP and SCOWT (OR=1.254; 95%CI=1.024–1.535), but not with child stunting (OR=1.167; 95%CI=0.976–1.395), or maternal overweight/obesity (OR=1.127; 95%CI=0.949–1.338). Compared to the food secure households, moderately food insecure households had the greatest odds of SCOWT (OR=3.665; 95%CI=1.782–7.538), followed by the mildly food insecure (OR=2.964; 95%CI=1.544–5.693) and severely food insecure households (OR=2.016; 95%CI=1.011–4.021). **CONCLUSION:** These results support the hypothesis that double burden of malnutrition is robustly related to food insecurity, and HFIAP is a good predictor of SCOWT.

PERCEPTIONS OF RACISM IN THE CONTEXT OF POLICE SHOOTINGS: MISSES OR FALSE-ALARMS IN OBSERVERS' ATTRIBUTIONS TO PREJUDICE?

Stuart S. Miller and Donald A. Saucier

Department of Psychological Sciences, College of Arts and Sciences

BACKGROUND AND PURPOSE: Recent incidents of police violence toward Black men are troubling. We examined observers' tendencies to make attributions to prejudice as predictors of their perceptions of racism when White police officers shoot Black suspects. Using a signal detection theory (SDT) approach to investigate the potential for errors in appraisals of prejudice (Barrett & Swim, 1998), we examined whether response biases and sensitivity to evidence would depend on individual differences in beliefs about the prevalence of racial prejudice. **METHOD:** Participants completed a measure of beliefs about the prevalence of racial prejudice (Miller & Saucier, 2015) and read a scenario where a White police officer shot and killed a Black suspect. Participants were randomly assigned to manipulated conditions. In one condition, cues strongly supported attributions to prejudice (the officer harassed the Black community), and in the other condition, cues did not (the officer returned fire, was a model community member). The dependent variable was operationalized as perceptions that the officer's behavior was as being motivated by racism. **FINDINGS:** Consistent with SDT, we found errors in attributions to prejudice depended on individuals' beliefs about the prevalence of racial prejudice. Unique to our study is the finding that response biases to not make attributions to prejudice were associated with beliefs that prejudice is rare, but sensitivity to evidence was associated with beliefs that prejudice is prevalent. **CONCLUSION:** Our research has important implications because it suggests that the more problematic attributional bias is failing to see racism when it is actually expressed than seeing racism when it is not.

FAMILY SEXUAL COMMUNICATION AND SEXUAL ATTITUDES: UNDERSTANDING THE INFLUENCE ON COUPLES' SEXUAL COMMUNICATION

Allen Mallory, Joyce Baptist, and Jared Durtschi

School of Family Studies and Human Studies, College of Human Ecology

BACKGROUND AND PURPOSE: Often we receive our first education about sexuality from our parents. Although these messages aren't always verbalized, they influence our sexual attitudes and behaviors. Little research has examined how parents' messages about sexuality influence how people communicate with their partners about sexual issues. This study examines how restrictive and permissive parental messages about sexuality are related to the quality of participants sexual communication in their current relationship when mediated by permissive and bonding sexual attitudes. **METHOD:** Survey data was collected from over 1000 undergradate students in intro level human development and sociology courses during the spring and fall 2015. Students in a current relationship were included in the analysis ($n = 446$). The Family Sexual Communication Scale, Brief Sexual Attitudes Scale, and Dyadic Sexual Communication Scale (DSCS) were used to measure their respective variable. All measures had alphas above .70. A multigroup (men and women) mediation path analysis was run using Mplus 7.31. Mediation of sexual attitudes was tested using bootstrapping. **RESULTS/FINDINGS:** The model was just-identified, so there are no fit indicies to report. For men, higher levels of permissive messages from parents were associaed with a a lower quality of sexual communication in their relationship ($\beta = -.28, p < .05$). For women, higher bonding sexual attitudes were associated with higher quality of sexual communication in their relationship ($\beta = .17, p < .01$). **CONCLUSION:** The results suggest that men and women's quality of sexual communication are influenced differently with men's influenced by parental messages and women's by their sexual attitudes.

RELATIONSHIP FACTORS INFLUENCING DOCTORAL STUDENT RETENTION AND SUCCESS: AN EXPLORATORY STUDY OF FACULTY ADVISOR AND DOCTORAL STUDENT PERCEPTIONS

Amanda J. Fairbanks

Department of Special Education, Counseling and Student Affairs, College of Education

BACKGROUND AND PURPOSE: The relationship doctoral students develop with their faculty advisors is said to be one of the most important relationships in graduate education. Completion of a doctoral degree requires overcoming numerous challenges, including navigating the faculty advisor/doctoral student relationship. These challenges have led to many problems for doctoral students including high attrition rates, extended time to degree completion, and inadequate training for teaching and research. The purpose of the study is to explore various aspects of the faculty advisor/doctoral student relationship within and across disciplines and at different stages of the program. This includes identifying how faculty and student perceptions differ, what the roles and characteristics of an advisor are, and what needs to exist in order for it to be a positive and beneficial relationship. **METHOD:** Faculty advisors and doctoral students at a four year public institution in two discipline areas: science, technology, engineering, math (STEM), and social sciences were selected to participate in this study. To answer the research questions, data was collected from faculty advisors and doctoral students using online surveys. **RESULTS:** Results will show differences and similarities in perceptions of faculty and students in two different disciplines, STEM and social sciences. **CONCLUSION:** This research identifies important information regarding differences in perspectives of faculty and students, how the advisor/advisee relationship changes throughout the course of students' graduate studies, and what differences exist across various disciplines. This research can help to strengthen the advisor/advisee relationship and potentially lead to increased retention and success of doctoral students.

BEYOND THE TRADITIONAL: AN EXAMINATION OF THE MULTIPLE MANIFESTATIONS OF FEMININE HONOR

Amanda L. Martens, Emily P. Nelsen, and Donald A. Saucier
Department of Psychological Sciences, College of Arts and Sciences

BACKGROUND AND PURPOSE While the construct of masculine honor has been extensively researched, there has been limited discussion and examination of feminine honor. In multiple studies, we examined the elements and perceptions of feminine honor. **METHOD/RESULTS:** In Study 1, participants were asked to list 10 behaviors or characteristics they believed should cause a woman pride and 10 for shame. Content analysis of the items indicated that pride and shame are perceived to result from two overarching themes: traditional and modern behaviors. Inspired by these themes, in Study 2 we manipulated a woman's life choice to examine participants' perceptions of honorability. Consistent with the idea that women's source of honor is derived from more than just traditional behaviors, the woman in the modern choice condition was perceived to be more honorable and less shameful compared to the woman in the traditional choice condition. In Study 3, we examined how these effects were moderated by individual differences in feminism and sexism. Consistent with hypotheses, we found that the perception of the modern choice as honorable was positively related to feminist and modern gender role beliefs and negatively related to sexist and traditional gender role beliefs, and that these relationships were reversed for perceptions of the traditional choice. **CONCLUSION:** These studies indicate that feminine honor has multiple manifestations, beyond those of sexual purity and familial duties. This program contributes significantly to current understandings of honor beliefs, and contributes a comprehensive and balanced understanding of honor beliefs' current manifestations in both men *and* women.

PREDICTING AND EXPLAINING BEHAVIORAL INTENTION AND HAND SANITIZER USE AMONG U.S. ARMY SOLDIERS

Naiqing Lin and Kevin R. Roberts
Department of Hospitality Management, College of Human Ecology

BACKGROUND AND PURPOSE: Many pathogenic microorganisms are spread by contaminated hands and may lead to foodborne illness. The use of hand sanitizers can significantly reduce bacterial contamination and is an efficient and inexpensive method to prevent infections and sickness. Previous researchers have found that the routine use of hand sanitizers allowed the U.S. Army to significantly reduce illness. However, few studies have been conducted within a U.S. Army dining facility, which is considered to be one of the primary sources of foodborne illness within the U.S. Army. Therefore, using the Theory of Planned Behavior, the purpose of this study was to identify the behavioral intention, attitudes, subjective norms, and perceptions of control of using hand sanitizer among military personnel. **METHOD:** The study targeted soldiers using a written survey during their lunch hour on the U.S. Army base at Fort Riley, KS. A total of 201 surveys were collected. All data were screened and entered into IBM SPSS for analysis. **RESULTS/FINDINGS:** Results indicated that attitudes, subjective norms, and perceived behavioral controls explained 64% of the variance in behavioral intention. Attitude and subjective norms were found to be significant predictors of behavioral intention, with attitude being the strongest predictor. **CONCLUSION:** Food production managers and Army commanders can use these results to implement hand sanitation behavioral interventions within military dining environments. Practical implications will likely translate to reduced healthcare costs, decreased absenteeism rates, and improved mission readiness.

CONTEXTUAL FACTORS RELATED TO SEXUAL ASSAULT SURVIVORS REPORTING TO UNIVERSITIES

Chelsea Spencer, Michelle Toews, and Sandra Stith

School of Family Studies and Human Services, College of Human Ecology

BACKGROUND AND PURPOSE: A recent national survey found that approximately 23.1% of female and 5.4% of male undergraduate students experience some form of sexual assault while enrolled at a university. Sexual assault is extremely underreported. This study examines contextual factors that influence survivors reporting the assault to university officials. **METHOD:** Using a sample of 223 sexual assault survivors from a large southern university, a path analysis was run in order to examine if who the perpetrator was, if the survivor received sexual assault training, and what type of sexual assault was perpetrated impacted who the survivor reported the assault to. The survivor's perception of the overall campus climate was used as a moderating variable. **RESULTS/FINDINGS:** It was found that receiving training ($OR = 6.90, p < .01$), and if the assault was anal sex, oral sex or vaginal sex significantly increased the likelihood of formally reporting the assault ($OR = 9.60, p < .05$). If the perpetrator was an acquaintance or a dating partner, the survivor was significantly less likely to formally report the assault ($OR = 0.04, p < .01$). If the survivor received training and had a positive perception of campus climate, they were significantly more likely to formally report the assault ($OR = 5.54, p < .01$). **CONCLUSION:** Results suggest that it is important to provide sexual assault training to all students and create an overall positive campus climate in order to increase formal reporting. It is also important to provide education about what constitutes as sexual assault.

WHAT IF THEY THINK I'M RACIST? FACTORS THAT AFFECT DECISIONS TO DISCUSS DIVERSITY INITIATIVES

Conor O'Dea, Stuart Miller, and Donald Saucier

Department of Psychological Sciences, College of Arts and Sciences

BACKGROUND AND PURPOSE: Previous research indicates that White individuals may experience discomfort and behave in a socially inhibited manner in interracial interactions due to experiences of stereotype threat (Goff, Steele, & Davies, 2008). According to this perspective, rather than being an expression of racial prejudice, avoidance during interracial interactions may be due to the awareness of the stereotype that Whites are racially prejudiced. This awareness may lead Whites to fear appearing racist in interracial interactions. Consequently, we hypothesized that Whites may avoid providing constructive diversity initiatives due to the fear that any criticism (even constructive) will be perceived as racist. **METHOD:** We presented 105 participants with details about a diversity initiative (higher versus lower in controversial nature), and provided them with the opportunity to interpersonally discuss the initiative with either a White or a Black experimenter or write their feedback in a 1 page paper and remain anonymous. **RESULTS/FINDINGS:** Consistent with our hypotheses based on stereotype threat theory, we found that participants chose to discuss criticisms with a Black experimenter significantly less often than with a White experimenter. This effect trended more strongly when the initiative was higher versus lower in controversial nature. **CONCLUSIONS:** Prosocial intergroup interaction and, further, constructive feedback for diversity initiatives is important. However, Whites may avoid even prosocially intended feedback due to a fear of appearing racist. Our study will hopefully inspire future research to increase the likelihood that individuals will engage in prosocial intergroup interaction, thus examining ways in which we may knock down the walls inhibiting prosocial intergroup interaction.

NOCTURNAL TRANSPIRATION IN A TALLGRASS PRAIRIE COMMUNITY

Kimberly O'Keefe and Jesse B. Nippert

Division of Biology, College of Arts and Sciences

BACKGROUND AND PURPOSE: The impact of nocturnal transpiration on ecohydrology has largely been ignored due to the assumption that plants close their stomata at night to preserve water loss during periods with no carbon gain. Thus, little is known about this phenomenon despite recent observations that nocturnal transpiration can contribute significantly to total plant water-use. Here, we assessed rates and variability in nocturnal transpiration for multiple grassland species within a tallgrass prairie. Our objectives were to: (1) quantify nocturnal transpiration in multiple species and (2) link nocturnal water loss with daytime plant physiology. **METHOD:** Field work was conducted at the Konza Prairie Biological Station located in the Flint Hills region of northeastern Kansas, USA. We measured leaf-level nighttime transpiration and whole-plant sap flow rates on eight grass, forb and shrub species across a single growing season (May-September 2014). **RESULTS/FINDINGS:** Substantial nocturnal transpiration occurred in multiple grassland species. At the leaf level, nighttime transpiration rates varied among species and across the growing season. Nighttime transpiration was greatest in the grasses early in the growing season and then decreased in all species as the year progressed. Nighttime sap flow rates also varied among species and typically accounted for 5-15% of total daily water flux at the whole-plant level. **CONCLUSION:** Our results suggest that patterns of nocturnal transpiration are variable at a small spatial scale, are dynamic through time, and can be a considerable portion of a plant water budget. This research highlights the importance of including nocturnal water loss when describing earth-atmosphere fluxes in grassland ecosystems.

GEOMETRIC MEASUREMENTS OF FIELD CROPS DURING EARLY GROWTH STAGES USING A TIME OF FLIGHT CAMERA

Justin Frazier

Department of Biological and Agricultural Engineering, College of Engineering

BACKGROUND AND PURPOSE: Measuring crops as they grow in the field is a great way to get important data to determine the health of the crop, however such infield measurements can be costly and time consuming. This research focuses on using a time of flight (TOF) camera to quickly and accurately take geometric measurements of the field crops. The TOF camera being used generates a point cloud image of the plant, where each pixel in the image has a distance associated with it. Mosaicking multiple point cloud images together can form a complete picture of the size and shape of the crop. **METHOD:** Five different field crops, corn, sorghum, soybeans, canola, and wheat, were planted in the greenhouse at Kansas State University. A movable frame was constructed to mount the TOF camera above said crops in order to get a top down view. Point cloud images of the plants were taken every three days as the plants grew to maturity. **RESULTS/FINDINGS:** By analyzing the point cloud data from the TOF camera, measurements of crop height, leaf area, leaf orientation, and leaf count can be reproduced. **CONCLUSION:** This data, along with other phenotyping data, can help form a complete picture of what is happening during growth and help identify problems occurring with the crop.

PHYSIOLOGICAL, BIOCHEMICAL AND MOLECULAR BASIS OF RESISTANCE TO PS II- AND ALS-INHIBITORS IN PALMER AMARANTH FROM KANSAS

Sridevi Betha, Curtis R. Thompson, Dallas E. Peterson, and Mithila Jugulam

Department of Agronomy, College of Agriculture

BACKGROUND AND PURPOSE: Palmer amaranth is one of the aggressive, troublesome and economically damaging weeds in several cropping systems across United States. A population of Palmer amaranth from Stafford County, KS was found to be resistant to different herbicide modes of action including PS II- and ALS-inhibitors. The objective of this study was to investigate the mechanisms of resistance to PS II (atrazine)- and ALS (chlorsulfuron)-inhibitors using a known sensitive Palmer amaranth as control. **METHOD:** A resistant (R) and a known susceptible (S) Palmer amaranth populations were grown in growth chamber and 10-12 cm tall plants were treated with different doses of atrazine and chlorsulfuron. DNA was extracted from R and S plants to analyze gene sequences of *PsbA* and *ALS*, target-sites of atrazine and chlorsulfuron, respectively. Metabolism study was conducted using, ¹⁴C-labeled (5.8kBq) atrazine treated samples by reversed-phase high performance liquid chromatography (HPLC). **RESULTS:** R plants were able to survive 10 and 8 times the field rate of atrazine and chlorsulfuron, respectively. The most common mutation (Serine264Glycine) associated with atrazine resistance in weeds was not found in any R plants. Furthermore, R plants rapidly metabolized atrazine via glutathione S-transferase (GST)-conjugation. On the other hand, a well-known mutation (Proline197Serine) associated with chlorsulfuron resistance was found in 25% of the R plants, suggesting ~75% of R plants may have a non-target-site, P450 mediated metabolism based resistance. **CONCLUSION:** Overall, this population evolved both target-site and non-target site resistances to multiple herbicides leaving fewer options for weed control, especially in no-till crop production systems.

PHENOTYPIC VARIATION OF THE DOMINANT PRAIRIE GRASS *ANDROPOGON GERARDII* AND ASSOCIATION WITH CLIMATE ACROSS MIDWEST GRASSLANDS CLIMATE GRADIENT

Jacob Alsdurf¹, Loretta Johnson¹, Nora Bello², Mary Knapp³, and Adam Smith⁴

¹*Division of Biology, College of Arts and Sciences;* ²*Department of Statistics, College of Arts and Sciences;*

³*Department of Agronomy, College of Agriculture;* ⁴*Missouri Botanical Garden*

BACKGROUND AND PURPOSE: *Andropogon gerardii* is an ecologically dominant grass in the Midwest. With wide distribution across a precipitation and temperature gradient, we expect ecotypic variation in drought tolerance and local adaptation. Understanding ecotypic variation will help predict how a dominant prairie grass may respond to current and predicted future climate change. Based on results from reciprocal gardens, we have shown evidence of local adaptation in big bluestem ecotypes as well as genetically-based adaptive divergence. **METHODS:** Our study characterizes phenotypes of 37 geographically distributed populations across the Midwest for each of the 37 populations; we grew plants from seed under greenhouse conditions that control for environmental by phenotype interaction. We measured phenotypes (blade width, height, biomass, and chlorophyll absorbance). Generalized mixed linear modeling was used to identify statistically significant differences among population phenotypes and principle component analysis was used to explore variance within data as related to climate variables. **RESULTS AND CONCLUSION:** Preliminary analysis shows a significant main effect among population phenotypes (height, width, biomass, and chlorophyll absorbance all $p < 0.001$) Population mean phenotypes are smaller in the west and phenotype means increase moving east longitudinally. PCA analyses show a phenotypic cline across populations that can be partially explained by longitude, mean annual precipitation, and vegetation type. These results support evidence for ecotypic variation in drought tolerance of *A. gerardii* to the climate gradient of Midwest. These data will be used as input for Species distribution model to predict changes in response to future climate in the range of *A. gerardii*.

MOBILE DRIP IRRIGATION: PROSPECTIVE TECHNOLOGY TO IMPROVE WATER PRODUCTIVITY OF CORN

Gia H.T. Nguyen¹ and Isaya Kisekka²

¹*Department of Biological and Agricultural Engineering, College of Engineering;* ²*KSU Southwest Research-Extension Center, Garden City, Kansas*

BACKGROUND AND PURPOSE: Mobile drip irrigation (MDI) is a combination of drip irrigation and center pivot irrigation technologies. MDI applies water along crop rows and has the potential to reduce water losses caused by droplet evaporation, canopy and soil water evaporation, wind drift, runoff and deep percolation. We hypothesized that MDI can produce better soil water redistribution in soil profile, minimize soil water evaporation and improve plant growth and water productivity. To test this hypothesis, an experiment was conducted at KSU Southwest Research- Extension Center, Garden City Kansas. The study seeks to compare soil water evaporation, water redistribution, leaf area index (LAI), grain yields, crop water use, and water use efficiency of corn irrigated by MDI and low elevation spray application (LESA). **METHOD:** Experimental design was a randomized complete block with four replications (4 spans of a center pivot each having MDI and LESA). Soil water was measured using neutron attenuation, LAI was measured by a LP-80 Ceptometer, soil evaporation rates were estimated using mini-lysimeters. **RESULTS AND CONCLUSION:** Preliminary results from the 2015 corn growing season indicate that drip line lateral spacing of 152 cm was adequate in Ulysses silt loam soils for dripper flow rates of 3.78 liters per hour emitter spacing of 15 cm. LAI of corn under MDI was similar to that of LESA ($p > 0.05$), and soil water evaporation under MDI was significantly lower than that under LESA ($p < 0.05$). Grain yield was not significantly different between MDI and LESA probably due to above normal rainfall in 2015.

PHYSICAL MAPPING OF *EPSPS* GENE COPIES IN GLYPHOSATE RESISTANT ITALIAN RYEGRASS POPULATIONS

Karthik Putta, Dal-Hoe Koo, and Mithila Jugulam

Department of Agronomy, College of Agriculture

BACKGROUND AND PURPOSE: Italian ryegrass infestation in crop fields can cause substantial yield losses. Several populations of Italian ryegrass evolved resistance to multiple herbicide modes of action due to selection pressure including glyphosate. Glyphosate is a 5-enolpyruvylshikimate-3-phosphate synthase (*EPSPS*) inhibitor and amplification or duplication of *EPSPS* contributes to glyphosate resistance in several weed species including Italian rye grass population from Arkansas. The objective of this study was to determine the distribution of duplicated *EPSPS* gene copies on the genome of glyphosate resistant Italian ryegrass from Arkansas (AKR). **METHOD:** AKR and a known sensitive Italian ryegrass (AKS) were used in the study. *EPSPS* gene amplification and expression of AKR and AKS was determined using quantitative PCR. Fluorescence in situ hybridization (FISH) was done on somatic metaphase root spreads using a 1.3kb *EPSPS* gene probe. **RESULTS:** AKR plants showed 12 to 60 *EPSPS* copies compared to AKS. Gene expression data correlated with the gene copy number. Our preliminary FISH analysis showed a random distribution of *EPSPS* gene copies on the genome. **CONCLUSION:** These results suggest for a possible transposon mediated amplification mechanism of the *EPSPS* duplication similar to previously reported case of glyphosate resistant Palmer amaranth. Physical mapping of *EPSPS* copies help understand the mechanism of gene amplification in Italian ryegrass. The resistant population with high *EPSPS* copies pose a serious challenge for weed management.

UNDERSTANDING THE RELATIONSHIP BETWEEN URBAN BEST MANAGEMENT PRACTICES AND ECOSYSTEM SERVICES

Kelsey McDonough, Trisha Moore, and Stacy Hutchinson

Department of Biological and Agricultural Engineering, College of Engineering

BACKGROUND AND PURPOSE: Increasing attentiveness to climate change and the dependence of human life on natural resources has spurred awareness about the detrimental impacts of human activity on the environment. Ecosystem services, or the benefits that humans derive from ecosystems, have changed more in the past fifty years than in any other comparable period in human history. The dilemma of managing the trade-off between immediate human needs and maintaining the ability of the Earth to provide ecosystem services is considered to be one of the largest challenges of this century. The ecosystem service concept aims to maximize the provision of services across an entire ecosystem to achieve overall ecosystem health through land management, policy, and economic decisions. The intent of this research was to improve such decisions by increasing the understanding about the relationship between urban best management practices and freshwater provision, erosion regulation, and flood regulation ecosystem services. **METHOD:** Fifty-six land management scenarios with varying densities of BMP application were simulated using the Stormwater Management Model (SWMM). The ecosystem services resulting from these land management scenarios were quantified using indices developed by Logsdon and Chaubey (2013). **RESULTS AND CONCLUSION:** Results demonstrate that the application of bioretention cells improve freshwater provision and erosion regulation services immediately downstream from the implementation site, and an increase in erosion regulation services was observed at the greater watershed scale. The culmination of this research will provide decision-makers with the knowledge to make sustainable land management, policy, and economic decisions that maintain water-related ecosystem services into the future.

SEPARATION OF MOLECULAR ISOMERS BY COULOMB EXPLOSION IMAGING AFTER INNERSHELL PHOTOIONIZATION WITH X-RAYS

Utug Ablikim¹, Cedric Bomme², Hui Xiong³, Evgeny Savelyev², Balram Kaderiya¹, Vinod Kumarapan¹, David Kilcoyne⁴, Artem Rudenko¹, Nora Berrah³, and Daniel Rolles^{1,2}

¹Department of Physics, College of Arts and Sciences; ²Deutsches Elektronen-Synchrotron, Hamburg, Germany; ³Department of Physics, University of Connecticut, Storrs, CT; ⁴Advanced Light Source, Lawrence Berkeley National Laboratory, Berkeley, CA

BACKGROUND AND PURPOSE: Isomers, i.e. molecules with the same chemical formula but different chemical structure, play a crucial role in many biological processes such as bacteriorhodopsin, photoactive yellow protein, and green fluorescent protein. They can have very different physical, chemical, and biological properties. Therefore, it is of interest to experimentally distinguish different isomers in order to investigate isomer-specific reactions and, in particular, to study the interconversion between different isomers in time-resolved experiments. **METHOD:** We used soft X-ray pulses from the Advanced Light Source synchrotron facility at the Lawrence Berkeley National Laboratory to "Coulomb explode" the molecules in a mixed sample of *cis* and *trans* isomers of 1,2-dibromoethylene ($C_2H_2Br_2$) molecules and to identify and separate the two isomers based on their fragmentation pattern. **RESULTS/FINDINGS:** By reconstructing the momentum vectors of the molecular fragments that are detected in coincidence, we find that the angular correlation between Br^+ fragments can be used to distinguish the *cis* and *trans* isomers. In order to verify our results, the experimental findings are compared with numerical Coulomb explosion simulations that agree well with the experiment. **CONCLUSION:** We show that using the Coulomb explosion imaging technique, it is possible to distinguish molecular isomers and to study their isomer-resolved photoionization dynamics. This opens the door to time-resolved studies of *cis-trans* interconversion (isomerization), which will allow further insights into chemical reactions involving isomers.

STRONG TUNABLE VISIBLE ABSORPTION PREDICTED FOR POLYSILO-ACENES USING TDDFT CALCULATIONS

K. L. Dimuthu M. Weerawardene and Christine M. Aikens
Department of Chemistry, College of Arts and Sciences

BACKGROUND AND PURPOSE: Graphene has been the most studied 2D material during the past decade for both fundamental research and novel applications including electronics, transparent protection layers, photovoltaics, and energy storage; however, its zero band gap and compatibility issues with existing silicon-based microtechnology drew attention toward other group IV analogs of graphene such as Si and Ge. Silicene, the silicon counterpart of graphene, is a 2D honeycomb lattice of Si that is expected to have extremely useful physical properties and hence would be a promising material for next-generation devices. However, silicene currently represents a synthetic challenge. There are a limited number of experimental studies that have created epitaxial silicene while there is no report of the formation of freestanding silicenes so far. **METHOD:** The optical and electronic properties of hypothetical polysilo-acenes, the building block of silicene with 2–6 fused rings are compared with corresponding polyacenes, the building block of graphene using time-dependent density functional theory (TDDFT). **RESULTS/FINDINGS:** We found that there are three spectral features in the absorption spectra analogous to α , β , and p-band peaks known for carbon-based acenes. The β peak is the most prominent feature in each spectrum, which appears in the visible region. The constructive interaction of configurations is characteristic of plasmons in carbon-based acenes and noble metal nanoparticles. Therefore, β peak can be identified as plasmonic for polysilo-acenes because of the constructive interaction of configurations. **CONCLUSION:** The strong visible absorption of polysilo-acenes warrants interest in these systems and suggests that polysilo-acenes represent an exciting synthetic target.

COMPARISON OF GEOCHEMISTRY GENERATED BY KIMBERLITE WEATHERING VS. LIMESTONE WEATHERING IN KANSAS

Colleen M. Gura, Pamela Kempton, and Saugata Datta
Department of Geology, College of Arts and Sciences

BACKGROUND AND PURPOSE: The Critical Zone is the realm where rocks meet life. This work examines the physical, chemical interactions which occur when Kimberlite eruptive materials form soils. Because soils can be lost due to many reasons, knowledge of soil formation processes and rates of formation and loss are critical in managing this resource. Kimberlites, 13 of which are in Riley County, are CO₂-rich igneous rocks high in Mg and Fe which originate deep in Earth's mantle, are low in SiO₂, but enriched in incompatible elements. They contrast in composition to the limestone and shale found throughout the Flint Hills. Understanding how kimberlites impact soils, the resulting soil nutrients, and how their constituents behave is important for understanding soil formation processes in the region. I hypothesize the kimberlite soil will have higher concentrations of Fe, Mg, Ca, K and trace elements and that the clays produced will differ as well. These differences should give the kimberlite-sourced soils significantly different properties than the thin limestone-sourced soils surrounding them. **METHOD:** X-Ray Fluorescence (XRF), X-Ray Diffraction (XRD), total elemental extraction, and particle size analysis are used to determine bulk chemistry of the samples and decide which are most appropriate for further analysis. Sequential Elemental Extraction, clay fractionation and polytype identification are being performed on the selected samples to understand the mobility of these major and trace elements in soil. **RESULTS AND CONCLUSION:** Kimberlite-sourced and limestone-sourced soils will occur at different rates, will produce different weathering products and could potentially have agricultural significance regarding ion and nutrient mobility.

NON-GAUSSIAN ERROR DISTRIBUTIONS OF LMC DISTANCE MODULI MEASUREMENTS

Sara Crandall and Bharat Ratra
Department of Physics, College of Arts and Sciences

BACKGROUND AND PURPOSE: Publication bias and/or correlations between measurements of a data set can significantly affect conclusions. We aim to study these potential effects in a compilation of Large Magellanic Cloud (LMC) distance moduli values, as the distance to this nearby galaxy is popularly studied due to its closeness and abundance of stellar tracers. **METHOD:** We first find central estimates from the data compilation using both weighted mean and median statistics. Using these central estimates, error distributions can be constructed, or histograms of measurements as a function of the number of standard deviations that a measurement deviates from a central estimate. We then compare these distributions to a normal Gaussian distribution. **RESULTS AND CONCLUSIONS:** We find that for the weighted mean case, the error distributions are non-Gaussian with extended tails, probably as a consequence of unaccounted-for systematic errors. For the median case they are narrower than expected, supporting the argument that this is a consequence of correlations between some of the measurements, with publication bias possibly also contributing mildly.

GEOCHEMICAL CONTROLS ON ARSENIC AND MANGANESE RELEASE INTO GROUNDWATERS FROM SEDIMENTS: IN RELATION TO NATURAL REACTIVE BARRIER

Michelle Berube and Saugata Datta

Department of Geology, College of Arts and Sciences

BACKGROUND AND PURPOSE: The presence of elevated levels of arsenic (As) and manganese (Mn) concomitantly in the groundwaters in SE Bangladesh poses serious health concerns for the millions of local inhabitants. Literature has shown that the consumption of water-borne As and Mn is known to cause a variety of neurotoxic effects, and prolonged exposure has carcinogenic effects. Arsenic is frequently adsorbed to the surfaces of Fe and Mn bearing minerals in sediments and is subsequently released when microbially driven reduction processes occur. This study investigates the surface water and groundwater interactions along the major river boundaries and to determine if the tidal and seasonal fluctuations of water tables has an effect on sequestering As, Mn within the Fe bearing minerals. **METHODS:** Shallow and deep groundwater samples are collected from the floodplains of the Meghna-river system. Groundwater samples are tested in the field for a multitude of geochemical parameters, and analysis of cations, anions, and stable isotopes ($\delta^2\text{H}$, $\delta^{18}\text{O}$) are performed. In addition, sediment soil core samples are collected at various depths along a transect from the Meghna River towards the villages. Solid state XRF analyses in field combined with bulk sediment extractions via ICP-OES extractions are being performed on sediment samples. **CONCLUSION:** While the isotopes of $\delta^2\text{H}$ and $\delta^{18}\text{O}$ will provide an understanding of the primary source of recharge within the shallow aquifers, the overall, the goal of this study is to understand the impacts of geochemical controls on arsenic and manganese release in aquifers from shallow to deep groundwaters in this region.

MICROWAVE EFFECTS ON CdSe NANOCRYSTALS SYNTHESIS

Bemnet A. Kebede and Emily McLaurin

Department of Chemistry, College of Arts and Sciences

BACKGROUND AND PURPOSE: Quantum dots (QDs) are semiconductors in the nanometer scale that have applications in many fields such as medical imaging, solar cells, photovoltaics, and displays. The synthesis method for quantum dots is through conventional heating which has some problems such as poor heat distribution, long reaction times, energy loss, and scalability. Nowadays, microwave-assisted heating is being used to synthesize quantum dots and it is faster and more efficient than the conventional heating. In this study, the effects of microwave on different reaction mixtures, solvents, and vessels is studied. **METHOD:** Glass vial, silicon carbide (SiC) vial, mineral spirits (3 mL), and water (3 mL) were used to study the effects of microwave irradiation. The internal and external temperatures of the reactions were collected using fiber-optic and IR sensor, respectively. Different powers and temperatures were applied for the CdSe QD synthesis and the heating efficiency was calculated by integrating the area of temperature over power ($^{\circ}\text{C}/\text{W}$). **RESULTS and CONCLUSION:** The mineral spirits and water study showed higher internal temperature and faster heating time with the water in the glass vial while in SiC both solvents showed similar heating time and temperature. The highest heating efficiency ($^{\circ}\text{C}/\text{W}$) was achieved in the glass vial for water and in the SiC vial for mineral spirits. In conclusion, reaction mixtures that absorb microwave irradiation well glass vial is preferred to achieve faster and efficient heating. For poor microwave absorbers SiC vial is preferred, since the SiC absorbs most of the microwave irradiation and the heating method is through convection heat transfer.

SCALE A MID-INFRARED OPTICALLY PUMPED GAS-FILLED HOLLOW-CORE FIBER LASER TO HIGH POWER

Neda Dadashzadeh, Kushan Weerasinghe, Manasa Thirugnanasambandam, Brian Washburn, and Kristan Corwin

Department of Physics, College of Arts and Sciences

BACKGROUND AND PURPOSE: Mid-infrared fiber lasers have exuberant applications due to their properties such as portability, compactness, and good beam qualities. Hollow Core Photonic Crystal Fibers (HC-PCF) form a basis to reach the same power levels as gas lasers by developing gas-filled fiber laser, which takes advantage of both fiber and gas lasers. Following the first demonstration of a Mid-infrared acetylene-filled laser based on population inversion in a HC-PCF, attempts have been made to scale the laser to higher power. **METHOD:** The set-up is pumped by the Optical Parametric Amplification (OPA) at a wavelength of 1.532 μm with maximum pulse energies of 10 μJ , a pulse duration of 1 ns, and a repetition rate of 30 Hz. Population inversion between vibrational states of acetylene molecules inside a HC-PCF results in P(13) and R(11) transitions; so, lasing happens at wavelengths of 3.114 μm and 3.172 μm . A very low loss fiber allows using longer fiber length, which increases 3 μm laser power at low pressures, where highest efficiency can be achieved. **RESULTS AND CONCLUSION:** Installing 10.9 meters of a low loss HC-PCF helped getting rid of saturation behavior of 3 μm laser power at low pressures. Attempts toward optimizing fiber length and increasing pump power have been made to reach highest 3 μm laser power.

SPECTROSCOPIC SINGLE-MOLECULE TRACKING REVEALS THE ONE-DIMENSIONAL DIFFUSION PATHWAYS IN SURFACTANT-TEMPLATED MESOPOROUS SILICA

Ruwandi Kumarasinghe, Takashi Ito, and Daniel A. Higgins

Department of Chemistry, Collage of Arts and Sciences

BACKGROUND AND PURPOSE: The confined orientational motions of fluorescent dye molecules diffusing along one dimension (1D) within individual silica mesopores are investigated by simultaneous single molecule tracking and single molecule emission dichroism methods. Perylene diimide dyes have been reported to exhibit strong orientational confinement as they diffuse within the nanometer-sized one-dimensional pores of cetyltrimethylammonium bromide (CTAB)-templated mesoporous silica films. It is expected that the Perylene diimide dye molecules are confined to the most hydrophobic regions of the surfactant micelles, and that formation of a water-rich solvent layer at the silica/surfactant boundary may also contribute but evidence for the actual location of the dye molecules is crucial. **METHOD:** The polarity sensitive dye Nile Red is employed in spectroscopic single molecule tracking studies to determine the exact location of the dye and Polarization-dependent single molecule tracking is used to show that the Nile Red molecules exhibit the similar orientational confinement as Perylene diimide dye molecules. **RESULTS/FINDINGS:** The spectroscopic single molecule tracking data reveal that the majority of 1D diffusing Nile Red molecules, as well as immobile and 2D diffusing populations are predominantly found in highly nonpolar environments. **CONCLUSION:** These results are most consistent with confinement of both the Nile Red and Perylene diimide dyes to the hydrophobic micelle core regions in the center of the pores.

MONITORING THE BIOGEOCHEMISTRY OF SHALLOW AQUIFER GROUNDWATER TO DETERMINE SOURCE SUPPLY AND PREDICT REACTIONS UPON CO₂ INJECTION INTO WELLINGTON FIELDS, KS

Ian Andree and Saugata Datta

Department of Geology, College of Arts and Sciences

BACKGROUND AND PURPOSE: Increasing awareness for the rising carbon dioxide (CO₂) emissions and the impact it has on global warming has placed emphasis on mitigation efforts to reduce atmospheric levels. Our current research is based on the environmental impact CO₂ has on shallow aquifer potable water following an injection into a geologic storage unit. The hypothesis we are building on is that if the CO₂ plume leaks from the target zone, then subsequent chemical reactions will lead to water quality degradation. The primary concern is when gaseous CO₂ combines with water to form carbonic acid, pH will decrease resulting in increased acidity; metals can be leached out and alter the hydrological connectivity of the aquifers. By understanding the level of influence from water source supply to the aquifers of concern we may then propose ways to preemptively protect the potable resources. **METHOD:** Water sampling events were conducted at surface water bodies as well as shallow monitoring wells that screen depths corresponding to different interconnected aquifers. Collected samples are analyzed for *major cations and anions* to determine composition, *rare earth element concentrations* in order to trace back to source of supply of these waters, *stable isotope ratios* to understand extent of mixing waters in subsurface and *microbial content* to understand how bacterial communities affect chemical reactions. A time series change methodology will be demonstrated to show pre-injection water quality variations which will serve as a basis for comparison to water analyses during and after injections.

KINETICS OF FRACTAL AGGREGATE SOL TO GEL TRANSITION

Raiya Ebini and Chris Sorensen

Department of Physics, College of Arts and Sciences

BACKGROUND AND PURPOSE: Colloidal aggregates are important in various industrial and biomedical applications. These aggregates, which have fractal characteristics, can grow until they fill the entire volume and form a gel. We define the ideal gel point as equal size, spherical aggregates grow big until they start touching. This definition allows us to calculate the aggregate/cluster size (R) at the ideal gel point (R_G). We aim to study the kinetics and morphologies of the sol to gel transition. **METHOD:** We use Dynamic Light Scattering (DLS) and Small Angle Light Scattering (SALS) simultaneously to make measurement on the gelation of a sol of 20 nm polystyrene spheres destabilized by MgCl₂ to form aggregates. **RESULTS:** We found that the aggregates have fractal dimension of 1.8, consistent with the Diffusion Limited Cluster Aggregate (DLCA). We also found that the aggregates kinetics of sol-gel transition has three different phases of growth. The first one is a cluster-dilute (aggregate size \ll separation) phase where the kinetics expressed by the kinetic exponent z take the value of $z=1$, consistent with the literature. The second phase is the cluster-dense (aggregate size \sim separation) phase shows that the kinetics are enhanced with $1 < z < 2$. The third phase is the rounding off phase resulting in dramatic reduction in the kinetics. This rounding off occurs when the cluster size reaches the theoretical R_G , in other words when the clusters start touching. **CONCLUSION:** Well known cluster-dilute kinetics transfer into cluster-dense kinetics which enhances aggregation up to the ideal gel point. Beyond the ideal gel point the aggregates motion becomes hindered.

A NONPARAMETRIC APPROACH TO ESTIMATE MULTIPRODUCT AND PRODUCT-SPECIFIC SCALE AND SCOPE ECONOMIES FOR AGRICULTURAL COOPERATIVES

Krishna P Pokharel and Allen Featherstone

Department of Agricultural Economics, College of Agriculture

The agricultural cooperatives industry in the U.S. has gone through significant changes after 1990s due to high commodity prices, increased competitions, international market access, consolidations, mergers and acquisitions. The number of grain, oilseed, and farm supply cooperatives has decreased by almost 50% from 1990 to 2012; however, the gross sales are nearly doubled and the majority of the share is concentrated to just a few large cooperatives. Thus these changes in farmer cooperatives forces them to operate efficiently. Otherwise, they may be forced to leave the industry if they are not competitive with investor-owned firms. Therefore, the future structure of agricultural cooperatives depends on the current relative cost and efficiency of individual cooperatives in the industry. This study examines multiproduct and product-specific economies of scale and scope, and cost efficiency for agricultural cooperatives using the data envelopment analysis (DEA) approach. The DEA approach does not account for uncertainty in estimates that may occur through sampling variability or uncertainty arising from the frontier estimation. Bootstrapping will be used to construct confidence intervals of efficiency estimates for hypothesis testing. In addition, the Tobit model will be used to examine the factors that affect cost efficiency. The preliminary results show that small cooperatives have large incentives to expand and use cost savings through multiproduct economies. Annual multiproduct scale economies indicate that cooperatives, on average, are operating close to constant returns to scale each year.

MODELLING THE IMPACT OF AIRLINE PRODUCT QUALITY ON AIRLINES' AND PASSENGERS' CHOICE BEHAVIOR

Philip G. Gayle and **Jules O. Yimga**

Department of Economics, College of Arts and Sciences

BACKGROUND AND PURPOSE: Airlines usually claim that air travel delays are out of their control, placing the blame on adverse weather or air traffic control as the most common reasons. Despite these claims, data on causes of flight delay reveal that the share of delay caused by weather and air traffic control has been on the decline while the share of delay caused by airlines has been on the rise. This suggests that on-time performance improvement is well within the reach of airline carriers. Airlines can invest in on-time performance but they would do so if the marginal improvement can lead to prices sufficiently higher than the increase in costs. **METHOD:** This study uses a structural econometric model that does not require having actual cost data to draw inference on cost changes associated with improvement in on-time performance. **RESULTS AND CONCLUSION:** We find evidence that a given airline's markup does not significantly change from improving on-time performance. This may explain why the industry's on-time performance is still far below satisfactory levels.

EXPENDITURE CONSTRAINED FARM PRODUCTION IN ARMENIA

Weldensie T. Embaye and Jason S. Bergtold

Department of Agricultural Economics, College of Agriculture

BACKGROUND AND PURPOSE: Increasing farm income by improving farm efficiency is a good alternative for Armenian farmers who do not have enough capital (expenditure constrained) to increase farm investment. In 2007-2008, water to market training focused on farm water management, high value agriculture, post-harvest, processing and marketing and access to credit training was offered to Armenian farmers. Studies in literature recommended extension and education to improve farm efficiency. The water to market training proposed to Armenian farmers who did not have enough knowledge about farming (Fortson et al., 2012) is expected to improve the resource use efficiency which in return increase income and reduce poverty. **METHOD:** Hence, this study will estimate the technical, allocative, and economic efficiency and assess whether or not training improves farm efficiency based on farm survey data using Data Envelopment Analysis approach. **RESULTS AND CONCLUSION:** we expect training to increase farm efficiency which contributes to poverty reduction through higher income.

DOES CONSUMER CONFIDENCE AFFECT DURABLE GOODS SPENDING DURING BAD AND GOOD ECONOMIC TIMES EQUALLY?

M Iqbal Ahmed and Steven P. Cassou

Department of Economics, College of Arts and Sciences

BACKGROUND AND PURPOSE: Recent econometric analysis shows that consumer confidence innovations have long lasting effects on economic activities like consumption. Using US data, we show this conclusion is more nuanced when considering an economy that has different potential states. In particular, we show that the connection between consumer confidence to some types of consumer purchases is important during good economic times, but is relatively unimportant during bad economic times. **METHOD:** We use state-of-the-art econometric techniques such as regime-switching econometric models. We used local projection estimation techniques. Our regime-switching models use the unemployment rate as the indicator distinguishing bad and good economic times and investigate impulse responses, Granger Causality and variance decompositions. **RESULTS/FINDINGS:** We consistently find that the impact of consumer confidence is dependent on the state of the economy for durable goods purchases. We also use this type of model to investigate the connection between news and consumer confidence and this connection is also state dependent. **CONCLUSION:** Our findings have important implications for recent policy debates which consider whether confidence boosting policies, like raising inflation expectations on big-ticket items such as automobiles or business equipment would lead to a faster recovery.

FINDING COMMON SUPPORT THROUGH LARGEST CONNECTED COMPONENTS

Sharif Mahmood and Michael Higgins

Department of Statistics, College of Arts and Sciences

BACKGROUND AND PURPOSE: Finding treatment effects in observational studies is complicated by the need to control for confounders. Often, this is performed by using relevant covariates to form groups of similar units containing both treatment and control units (e.g. statistical matching). Under this method, treatment effects are only reliably estimated for a subpopulation under which a common support assumption holds---intuitively, that every treated unit has a similar control unit in the subpopulation. Hence, determining regions of common support is necessary for researchers to accurately estimate treatment effects and to make claims about the population under study. **METHOD:** Given a distance metric measuring dissimilarity between units, we use techniques in graph theory to find common support. We construct an adjacency graph where edges are drawn between similar treated and control units. We then determine regions of common support by finding the largest connected components (LCC) of this graph. LCC improves on existing methods by efficiently constructing regions that preserve clustering in the data while ensuring interpretability of the region through the distance metric. We consider several different ways of specifying the distance metric and of constructing the adjacency graph. **RESULTS/FINDINGS:** We apply our technique to a study evaluating the economic impact of worker training programs. We show our method compares favorably to current methods.

FOREIGN VERSUS NATIONAL: THE EFFICIENCY OF ETHANOL PLANTS IN BRAZIL.

Ana Claudia Sant'Anna¹, Jason Bergtold¹, Allen Featherstone¹, and Marcellus Caldas²

¹Department of Agricultural Economics, College of Agriculture; ²Department of Geography, College of Arts and Sciences

BACKGROUND AND PURPOSE: Economic studies point to efficiency differences between multinational and nationally owned firms. It is argued that multinational firms in Brazil may have better management practices than national owned firms. Does this extend to the ethanol industry? This study aims at analyzing if foreign owned ethanol mills are more technically efficient than nationally owned refineries. **METHOD:** Technical efficiency of ethanol mills in Brazil are estimated using Data Envelopment Analysis (DEA). This nonparametric approach allows the estimation of various efficiency measures. Data from 2013 consists of information on individual mill's amount of sugarcane crushed, origin of the sugarcane (if produced by the mill or by a supplier), the amount of sugar and ethanol produced, number of workers, location of the mill, ownership, amount of energy used and produced, and soil type. **RESULTS/FINDINGS:** Given the literature, I hypothesize that foreign-operated mills are more efficient than nationally run ethanol plants. **CONCLUSION:** This research sheds light on the efficiency of ethanol mills, national and international, in the center-east of Brazil. Results can shape policies aiming at helping inefficient mills become more efficient.

**ENGLISH LANGUAGE PROFICIENCY AND EMPLOYMENT AMONG IMMIGRANTS IN US:
EVIDENCE FROM NEW IMMIGRATION SURVEY**

Haydory Akbar Ahmed

Department of Economics, College of Arts and Sciences

BACKGROUND AND PURPOSE: Immigrants enroll in English classes, also enroll for college to enhance their success in the job-market in US. However, enrollment in college leads to endogeneity issues. **METHOD:** We use spouse years of education as instrument to overcome the endogeneity problem in the instrumental variable probit estimation. **RESULTS/FINDINGS:** Enrolling for an English class increases employment probability by 0.10% for both male and female immigrants. Enrolling for college reduces employment probability for female immigrants by -0.05%. Ability to speak or understand English does not have any effect on male employment. But for females' ability to speak well and ability to understand well increases employment probability by 0.10% and 0.07% respectively. Anderson-Rubin and Wald tests reject the null of weak instrument, which indicate the instrument is valid one to overcome the endogeneity. **CONCLUSION:** This findings justify investment in education and language proficiency among immigrants.

SUSCEPTIBILITY TO FUSARIUM THAPSIUM IN GRAIN SORGHUM INVOLVES HOST TRANSCRIPTIONAL REPROGRAMMING

Ananda Bandara¹, Dilooshi Weerasooriya², Sanzhen Liu, and Christopher Little¹

¹Department of Plant Pathology, College of Agriculture; ²Department of Agronomy, College of Agriculture

BACKGROUND AND PURPOSE: *Fusarium thapsinum* (FT) is a hemibiotrophic fungus causing stalk rot disease in sorghum. Although host resistance has been deployed, inability to achieve a complete control of the disease has been partly attributed to the lack of understanding on the molecular basis of resistance. The objectives of this study were to: i) discover differentially expressed genes (DEG) of sorghum in response to FT inoculation and understand their contribution to resistance, and ii) investigate sorghum expression profile changes that may correspond to lifestyle transition of the fungus. **METHOD:** Two sorghum genotypes; resistant (SC599) and susceptible (Tx7000), were grown in the greenhouse and inoculated with FT. Control plants were mock-inoculated with phosphate-buffered saline. Sorghum stalk RNA was extracted from 3 biological replicates at 2, 7, and 30 d post-inoculation (dpi) and was subjected to RNA-Seq. Analysis for DEG was performed with DESeq2 and pathway analysis was performed to explore DEG. **RESULTS/FINDINGS:** 4412 annotated genes were identified across the 3 post-inoculation time points (pti) as differentially expressed between 2 genotypes of which 1153 were components of 175 known metabolic pathways. 19 genes were common among the 3 pti. Most genes in the resistant host did not show a significant differential expression at 2 and 7 dpi, while those of the susceptible exhibited significant upregulation, demonstrating the involvement of "susceptibility genes" in disease manifestation. The opposite phenomenon was evident at 30 dpi. **CONCLUSION:** Findings suggest the occurrence of host transcriptional reprogramming which may coincide with the switch of FT from biotrophy to necrotrophy.

CHARACTERIZATION OF VIRULENCE OF GENETICALLY DISTINCT RIFT VALLEY FEVER VIRUS STRAINS IN MICE

Aaron Balogh¹, Vinay Shivanna¹, A. Sally Davis¹, Igor Morozov¹, Wenjun Ma¹, Tetsuro Ikegami², William Wilson³, and Juergen Richt¹

¹Department of Diagnostic Medicine and Pathobiology, College of Veterinary Medicine; ²Department of Pathology, The University of Texas Medical Branch at Galveston, Galveston, TX; ³United States Department of Agriculture, Agricultural Research Service, Arthropod Borne Animal Disease Research Unit, Manhattan, KS

BACKGROUND AND PURPOSE: Rift Valley fever virus (RVFV) is a vector-borne, zoonotic virus endemic to sub-Saharan Africa, Egypt, and countries of the Arabian Peninsula that causes severe disease in ruminants and humans. Due to the emergence of RVFV within the past 150 years, genetic diversity is low with a maximum divergence of 5% and 2% at the nucleic and amino acid levels, respectively. Despite these similarities, interstrain differences in virulence have been documented. However, in most cases these differences are anecdotal and not determined within individual host species in controlled experimental settings. The objective of this study was to determine the virulence of 4 genetically distinct RVFV strains using a mouse model. **METHOD:** Mice were challenged subcutaneously with serially diluted quantities of RVFV and monitored for survival. Survival data were then used to calculate lethal dose 50 (LD₅₀) and mean time to death values to quantify the virulence of each strain. **RESULTS:** Wild-type RVFV strains from Saudi Arabia and Kenya had lower LD₅₀ and mean time to death values and were thus more virulent than RVFV strains Zinga and South Africa 1951. **CONCLUSION:** These data suggest that interstrain genetic differences can influence RVFV virulence in mice. Further characterization is needed to determine which genes/sequences contribute to these phenotypic differences and whether these genetic changes also control virulence in natural hosts.

ASSESSMENT OF LIGHT CHAIN DIVERSITY IN NAÏVE MOUSE ANTIBODY REPERTOIRE

Claire Ward, Trisha Rettig, and Stephen Keith Chapes

Division of Biology, College of Arts and Sciences

BACKGROUND AND PURPOSE: B cells are white blood cells that make antibodies for host defense. Diversity and specificity arises from the complex assembly of B cell receptors (BCR), which are antibodies. Antibody structure consists of two heavy and two light chains of amino acids, the latter of which is comprised of one of Variable (V) and one Joining (J) gene segment. The region in which V and J combine, referred to as the Complementarity Determining Region 3 (CDR3), plays a primary role in determining antibody affinity for its antigen. BCR editing mechanisms primarily target the light chain to increase affinity to antigen and reduce autoreactivity. The total composition of antibody specificities, or antibody repertoire, can be assessed via next generation sequencing (NGS). Here, we assess the light chain diversity within the antibody repertoire of unimmunized mice. **METHODS:** Splens from four unimmunized C57BL/6 mice were pooled and sequenced via Illumina NGS platform. Sequencing datasets were cleaned using CLC genomics workbench and mapped to reference libraries obtained from ImMunoGeneTics Information System (IMGT) and NCBI. Frequency of V and J gene segment usage, and composition of CDR3 regions was assessed. **RESULTS/FINDINGS:** Frequency of V and J gene segment usage was consistent across all three technical replicates. CDR3 length for these sequences was conserved at 9 amino acids. **CONCLUSION:** We have established an effective workflow for assessing the light chain repertoire of C57BL/6 mice which can now be used to assess the importance of vaccine use on antibody V gene usage.

MICROALGAE ORGANELLE ISOLATION AND ENZYME DISRUPTION AS PART OF AQUEOUS ENZYMATIC EXTRACTION

Chelsea Dixon, Laura Soto Sierra, and Lisa R. Wilken

Department of Biological and Agricultural Engineering, College of Engineering

BACKGROUND AND PURPOSE: The use of aqueous enzymatic extraction (AEE), a non-solvent and environmentally friendly oil recovery method, provides an opportunity to design an integrated process for protein and oil fractionation to reduce costs of bioenergy production. To release oil from the intracellular matrix, it is necessary to understand lipid body structure and attachment to organelles in microalgae cells. Isolating individual organelles of the microalgae cell offers a system free of contaminating cellular components upon which to conduct enzyme screening for the release of oil. Knowledge of mechanistic interactions and requirements for organelle membrane lysis and bioproduct release and recovery can be assessed and integrated back into the overall AEE scheme. **METHOD:** A study was conducted to isolate intact chloroplasts from *Chlamydomonas reinhardtii* and assess disruption of membranes and the release of oil bodies. Isolated chloroplasts were treated with acidic and basic proteases and phospholipases to cleave protein and lipid components of the chloroplast or oil body membranes. **RESULTS/FINDINGS:** The enzymes necessary to catalyze lysis of the chloroplast and oil body membranes were identified and the established enzyme treatment can be integrated back into the complex AEE process. **CONCLUSION:** Results indicate that working with an isolated organelle system allowed for controlled application and assessment of the interactions of individual enzymes with their substrates. The isolated organelle enzyme screening experiments allow for a modular approach to designing the overall aqueous enzymatic extraction of bioproducts from microalgae.

FINDING BINDING PREFERENCES AND ENHANCING SOLUBILITY OF ERLOTINIB AND ITS MIMICS

Manomi Perera¹, Christer B.Aakeröy¹, Victor W. Day², and Abhigeet Singha¹

¹Department of Chemistry, College of Arts and Sciences; ²Department of Chemistry University of Kansas

Background and Purpose: Erlotinib hydrochloride (Tarceva) is used to treat several types of cancer. It is a reversible tyrosine kinase inhibitor, which acts on epidermal growth factor receptor (EGFR). This drug binds in a reversible fashion to the adenosine triphosphate (ATP) binding site of EGFR, which is often highly expressed in various forms of cancer. However, Erlotinib hydrochloride is only very slightly soluble in water, slightly soluble in methanol and practically insoluble in acetonitrile, acetone, ethyl acetate and hexane and limits its usefulness as a drug. **Method:** In this study Erlotinib will be co-crystallized with highly soluble small molecules which contain functionalities that can provide new solid forms of Erlotinib with improved aqueous solubility. Also, in order to obtain a better understanding of binding preferences of Erlotinib and improving its solubility Erlotinib mimics, will be synthesized and co-crystallized with small molecules. **Results:** After combining both Erlotinib and its mimics thereof with suitable co-formers, interactions will be initially analyzed via IR spectroscopy and the positive results will be subjected to different crystal growth techniques to get X-ray quality crystals. After analyzing crystal structures via X-ray diffraction, binding preferences and intermolecular interactions of Erlotinib and its mimics will be identified. The aqueous solubility of most promising co-crystals will then be carried out.

VALIDATION AND CHARACTERIZATION OF INSECT VECTOR PROTEINS THAT INTERACT WITH TOMATO SPOTTED WILT VIRUS

Catherine L. Stewart, Karen Barandoc-Alviar, Ismael E. Badillo-Vargas, and Anna E. Whitfield

Department of Plant Pathology, College of Agriculture

BACKGROUND AND PURPOSE: Plant viruses cause significant crop losses world wide, and many of these pathogens are transmitted horizontally by insects. *Tomato spotted wilt virus* (TSWV), must be acquired by larval thrips to be transmitted when these thrips become adults. This project aims to better understand virus acquisition by thrips through studying the interaction between proteins in larval thrips (*Frankliniella occidentalis*) and TSWV. Previous work includes the resolution of larval thrips by two-dimensional gel electrophoresis and overlay assays with virions and glycoprotein (G_N). Six TSWV interacting proteins (TIPs) were found to interact with TSWV virions and G_N. Present work addressed the tissue specific location of TIPs *in vivo* as well as the confirmation of TIPs interaction with G_N. **METHOD:** *In vivo* localization of four TIPs was achieved through use of peptide polyclonal antibodies and confocal microscopy. Split-ubiquitin membrane based yeast-two hybrid system (MbY2H) was used to validate the interaction between TIPs and G_N. **RESULTS/FINDINGS:** In localization studies, TIPs were found in midgut and salivary gland tissues. This is significant given that TSWV must replicate and infect these tissues for successful transmission to plants. *In silico* characterization of TIPs suggests they may have functions in viral entry and escape of thrips' tissues. Four of the six TIPs were found to interact with G_N through MbY2H. Testing for interaction between two of the six TIPs and G_N is in progress. Future work will focus on testing interaction between TIPs and other TSWV structural proteins beyond G_N. This work provides the first identification of TIPs in *F. occidentalis*.

BONE MICRO-ENVIRONMENT TARGETED MAGNETIC NANOMEDICINE

Tuyen Duong Thanh Nguyen^{1,2}, Arunkumar Pitchaimani^{2,3}, Mukund Bahadur Koirala^{2,3}, Hongwang Wang¹, Stefan H. Bossmann^{1,2}, Santosh Aryal^{1,2*}

¹Department of Chemistry, College of Arts and Science; ²Nanotechnology Innovation Center of Kansas State (NICKS); ³Department of Anatomy and Physiology, College of Veterinary Medicine

BACKGROUND AND PURPOSE: Nearly 2 out of 3 patients with advanced metastatic breast cancer will develop bone metastasis. Targeting metastatic cancers in bone still remains the oncological challenge due to poor drug availability and microenvironment-induced resistance. Here we engineered theranostics nanomedicine (TNs) made up of poly(lactic-co-glycolic acid) (PLGA) cores containing doxorubicin (DOX) and super-paramagnetic iron-oxide nanoparticles (SPIOs, diameter: 5nm) decorated peripherally by Alendronic acid, a member of bisphosphonate that strongly binds with bone mineral capable of targeting bone microenvironment. In this presentation, we will discuss its magnetic properties, targeting, and therapeutic efficiency against mouse osteosarcoma. **METHODS:** TNs proposed herein is made up of biodegradable/biocompatible PLGA, SPIOs, and DOX. Nanoprecipitation techniques were used to fabricate the TNs. Along with physiochemical and magnetic properties, the therapeutic evaluation of TNs was performed using a mouse osteosarcoma model. **RESULTS/FINDINGS:** The designed TNs were found to be 100±5nm in size with higher structural integrity as evidenced by TEM analysis. The drug and SPIOs loading content of the TNs were found to be 70µg/mg and 7µg/mg of TNs, respectively. Further, the relaxometric analysis of the designed TNs shows enhanced r_2 relaxivity from 48-210mM⁻¹s⁻¹ at 14T, which is an order of magnitude higher than that of iron oxide based clinically used magnetic contrast agents, such as Feridex[®] ($r_2 = 120 \text{ mM}^{-1}\text{s}^{-1}$) and Supravist[®] ($r_2 = 57 \text{ mM}^{-1}\text{s}^{-1}$). **CONCLUSION:** Due to the multi-functionality and higher magnetic relaxivity, TNs proposed herein hold a promise in treatment and diagnosis of cancer occurring in the bone by limiting off target effects.

GENETICS OF SPERMATOPHORE COAT FORMATION IN THE GROUND CRICKET (*ALLONEMOBIUS SOCIUS*)

Bettina M Jancke and Jeremy L Marshall

Department of Entomology, College of Agriculture

INTRODUCTION: In ground crickets (*Allonemobius socius*), the male produces a spermatophore that is used to transfer the male's sperm and accessory gland proteins into the female during copulation. The basic structure of the spermatophore resembles a small hollow ball (that contains the male's ejaculate) with a straw sticking out it, which is used to attached to the female and deliver the spermatophore's contents. An important feature of the spermatophore is the spermatophore coat (which forms the hollow ball). The spermatophore is initially produced as a gelatinous mass of proteins that harden to form the ball structure. As the spermatophore hardens, pressure builds inside. Once the spermatophore is attached to the female, sperm will be expelled into the female due to the increased pressure. Here, we identified three candidate genes (Spc1, Spc2 and Spc3) that are predicted to be structural proteins in the spermatophore. **METHOD:** To assess the proteins' functions, we conducted RNA inference experiments on each to test gene function. We hypothesized that the knockdown of these genes results in a deformation of the spermatophore coat. **RESULTS/FINDINGS:** We found that the knockdown of each of these genes leads to a deformation of the spermatophore coat, which in turn leads to unsuccessful copulation and no egg fertilization. Overall, we show that these genes are involved in the formation of the spermatophore coat and therefore, are crucial for reproductive success in ground crickets.

Poster Abstracts

Agricultural Sciences 1

IDENTIFICATION AND QUANTIFICATION OF CAROTENOIDS IN VARIOUS PHENOTYPIC SORGHUM ACCESSIONS

Yanting Shen¹, Xiaoyu Su¹, Xi Chen¹, Davina Rhodes², Benjamin Katz³, John Tomich³, and Weiqun Wang¹

¹*Department of Human Nutrition, College of Human Ecology;* ²*Dept of Biochemistry, College of Arts and Sciences* ³*US Department of Agriculture, Manhattan, KS*

BACKGROUND: Sorghum is a staple crop consumed in some regions of Africa and Asia, where vitamin A deficiency is prevalent. **PURPOSE AND METHOD:** The objective of this study was to identify and quantify the carotenoids by LC-MS in the diversity of phenotypic sorghum accessions. **RESULTS:** Totally, five carotenoids (α -carotene, β -carotene, lutein, zeaxanthin, and β -cryptoxanthin) were identified. Top three carotenoids (lutein, zeaxanthin and β -carotene) accounted for more than half of the total carotenoids were quantitated. A high content of total carotenoids was detected in the sorghum accessions with yellow endosperm (PI533943, PI655996, PI656096, PI656010), but high β -carotene content was found in the accessions with brown or yellow pericarp (PI656010, PI655996, PI656096). PI656010 possessed the highest content of both carotenoids and β -carotene up to 43.7 and 18.6 ng/g dry weight, respectively. No carotenoids were detectable in the accessions with white/red pericarp or white endosperm (PI656112, PI297104). **CONCLUSION:** Developing an association of phenotypic diversity of sorghum varieties with carotenoid profile may contribute to a healthy benefit in vitamin A deficiency prevention (supported by USDA Cooperative KS511-1001903).

CHARACTERIZATION OF ANTHOCYANINS IN SWEET POTATO SHOOTS

Xiaoyu Su¹, Jason Griffin², Benjamin Katz³, John Tomich³, and Weiqun Wang¹

¹*Department of Human Nutrition, College of Human Ecology;* ²*Department of Horticulture, College of Agriculture;* ⁴*Department of Biochemistry, College of Arts and Sciences*

BACKGROUND: We previously selected an anthocyanin-enriched purple-fleshed sweetpotato P40 that prevented colorectal cancer in a murine model. **PURPOSE AND METHOD:** The objectives of this study was to characterize anthocyanins in P40 shoots used as common edible greens. Eight anthocyanins have been identified and quantified in leaves of P40 by HPLC-MS/MS, whereas fourteen anthocyanins have been found in the control white-fleshed Bonita and orange-fleshed Beauregard. **RESULT:** The three most abundant anthocyanins were cyanidin 3-caffeoyl-p-hydroxybenzoyl sophoroside-5-glucoside, peonidin 3-caffeoyl sophoroside-5-glucoside, and cyanidin 3-(6"-caffeoyl-6"-feruloylsophoroside)-5-glucoside, which comprised up to 58% of total anthocyanins in leaves of P40. The content of anthocyanins in leaves of P40 (17 mg/kg dry matter) was much lower than that in the flesh (13,000 mg/kg dry matter). No anthocyanin was detectable in the stem. The content of anthocyanins in P40 greens was also much lower than that in the Bonita (563 mg/kg dry matter) and Beauregard (334 mg/kg dry matter). The total phenolic content in leaves of P40, as measured by Folin-Ciocalteu, was 36.8 \pm 4.8 mg GAE/g dry weight, compared with Bonita at 46.7 \pm 2.1 mg GAE/g dry weight and Beauregard at 41.2 \pm 5.0 mg GAE/g dry weight. **CONCLUSION:** Therefore, Bonita sweetpotato shoots could be served as a widely accepted functional product for health benefits. (supported by USDA Cooperative KS511-1001903).

DEVELOPMENT OF A ROCKY MOUNTAIN/SOUTHWESTERN GLUTEN-FREE VEGAN ENCHILADA MEAL

Steven Ross¹, Yuda Ou¹, Audrey Boeken¹, Joshua Wilson¹, Jayendra Amamcharla^{1,2}, and Kelly Getty^{1,2}
¹Food Science Institute, College of Agriculture; ²Department of Animal Sciences and Industry, College of Agriculture

BACKGROUND AND PURPOSE: As a result of changes toward more fast-paced, increased health-consciousness, and variety-seeking lifestyles, the demand for a new frozen, retail, and microwaveable meal utilizing locally grown ingredients has increased. In the Rocky Mountain/Southwestern region, one of the consumer-driven trends in food product development is to fulfill the need of vegan diet with celiac concerns, and to provide an excellent source of protein. The objective of this study was to develop a commercial gluten-free vegan enchilada meal, fitting into Rocky Mountain/Southwestern style cuisine and utilizing pulse ingredients. **METHOD:** Gold standard recipes of a vegan black-eyed pea and chickpea enchilada with salsa *verde* sauce, and a succotash side-dish were developed. Commercial products modified from gold standard recipes were made with added functional ingredients in order to achieve a one-year frozen shelf-life and to preserve the desired characteristics and culinary arts. **RESULTS:** A 324 g single-serving and microwaveable meal was formulated and manufactured using chickpeas, cowpeas, lentils, vegetables, and other plant-based functional ingredients. The resultant vegan enchilada meal can be claimed as excellent sources of Protein (23 g per serving), Dietary Fiber, Vitamins A, B6, C, Thiamin, Folate, Iron, and Magnesium. Ingredient cost to produce one unit commercialized product was calculated to be \$0.92. **CONCLUSION:** With its exceptional quality and flavor profile, and low manufacturing costs, the southwestern vegan enchilada with salsa *verde* and Rocky Mountain succotach meal has the potential to achieve market success.

INFLUENCE OF PACKAGING TYPE ON SHELF LIFE OF FOOD SERVICE PACKAGED BACON SLICES

MaryAnn J. Matney, Aaron M. Tapian, Brandon L. Goehring, John A. Unruh, Bryce M. Gerlach, Garrett D. McCoy, John M. Gonzalez, Travis G. O'Quinn, and Terry A. Houser
Department of Animal Sciences and Industry, College of Agriculture

BACKGROUND AND PURPOSE: Bacon is susceptible to oxidation due to high fat and salt content, along with low nitrite content. Retail bacon is stored in anaerobic conditions, however, food service utilizes an aerobic packaging scheme. Oxidation is promoted in aerobic, frozen storage conditions. Therefore, the purpose of this study was to examine shelf-life characteristics of bacon slices packaged aerobically and anaerobically during extended frozen storage. **METHOD:** Pork carcasses were randomly assigned to aerobic and anaerobic packaging treatments. Bellies were divided into ten shelf life dates (d 0, 28, 56, 70, 84, 98, 112, 126, 140, and 154), stored at 0°C and evaluated for fat color and lipid oxidation at the test date. Instrumental color readings; L* (lightness), a* (redness), and b* (yellowness) were recorded on fat color and thiobarbituric acid reactive substances (TBARS) were measured on each shelf-life date. **RESULTS:** L* values increased from d 0 to d 154, while a* values decreased for aerobically packaged bacon. Anaerobically packaged bacon's b* values and a* values increased (P<0.05) throughout the shelf-life. TBARS values did not increase (P>0.05) from d 0 to d 84 for anaerobically packaged bacon. There was an increase (P<0.05) in TBARS values from d 0 to d 28 in aerobically packaged bacon, as well as being higher from d 28 to d 154. **CONCLUSION:** Aerobic packaging decreased the oxidative shelf-life of the bacon and produced a lighter, less red product throughout the 154 d shelf-life. Anaerobic packaging showed a more oxidatively stable, redder and more yellow product throughout the shelf-life.

IMPACT OF IODINE VALUE ON FRESH PORK BELLY CHARACTERISTICS AND BACON QUALITY

Garrett McCoy, Aaron Tapian, Brandon Goehring, John Unruh, Bryce Gerlach, MaryAnn Matney, John Gonzalez, Travis O'Quinn, and Terry Houser

Department of Animal Sciences and Industry, College of Agriculture

BACKGROUND AND PURPOSE: Iodine value (IV), a measurement of the saturation of fat, is used as an indicator of pork fat quality. Economics of diet formulation in pork production result in variation of IV, which may result in poor pork quality. Thus, it is beneficial for bacon processors to develop a system to manage this variation in fat quality. The purpose of this study was to determine the impact of three levels of IV on fresh belly characteristics, chemical analysis, fatty acid composition, and collagen content of bacon. **METHODS:** Seventy-two pork carcasses were sorted into three IV categories of 58-63 g/100g (Low), 68-73 g/100g (Intermediate), and 78-83 g/100g (High). From each carcass, bellies were removed from the right and left sides, for a total of 144 bellies with 48 bellies in each IV category. Belly firmness and dimensional characteristics of fresh bellies were measured. Bellies were commercially processed into bacon and chemical characteristics, fatty acid profile, and collagen content were analyzed. **RESULTS:** As IV increased, belly firmness decreased ($P < 0.05$). High IV bellies yielded bacon with greater IV compared to the Low and Intermediate categories ($P < 0.05$). Bacon from High IV bellies had greater polyunsaturated fatty acids compared to the Low and Intermediate categories ($P < 0.05$). Bacon from High IV bellies had greater ($P < 0.05$) total collagen content compared to the Low category. **CONCLUSION:** High IV resulted in pork carcasses with softer bellies with increased polyunsaturated fat content and a greater amount of connective tissue. The compositional changes that take place with increased IV may negatively impact bacon slice yields.

PARTICULATE FLOW MEASUREMENTS AND IMPLICATIONS IN FOOD EXTRUSION

Cameron McGuire¹, Sajid Alavi¹, and Kingsly Ambrose²

¹*Department of Grain Science and Industry, College of Agriculture;* ²*Department of Agricultural and Biological Engineering, College of Engineering, Purdue University*

BACKGROUND AND PURPOSE: Innovations in food extrusion technology are enabling its rapid expansion and applicability in diverse areas related to bioprocessing and value addition to snack foods and other food items. This study relates raw material particulate rheology to the granular flow of food powders in a single-screw food extruder. **METHOD:** Raw materials based on corn (namely meal, flour, and starch), wheat (namely farina, flour and starch), and sugar (namely granulated, superfine, and powdered) were used as model powder systems for the study. Various powder-scale characteristics and flow parameters of these nine materials were determined using a powder rheometer, a promising new offline tool. Properties such as flow energy requirements, specific energy per gram of powder, cohesion, powder stability, and flow function were good indicators of the ease of flow in an extruder. **RESULTS/FINDINGS:** In all tests, corn meal exhibited lower specific energy requirements and stability index than corn flour (wheat showed a similar pattern), while both wheat systems showed comparatively lower energy requirements, stability indices, and flowability than their comparable corn systems. Additional testing of the effects of moisture content were also explored, showing that increases in moisture result in greater overall energy requirements for flow and higher compressibility, but a decrease in flowability. **CONCLUSION:** It was concluded that powder rheometry is a valuable tool for understanding flow of powdered material in food extruders and can be potentially used for optimizing the design of extrusion screws, in terms of metallurgy and geometry, although further studies are needed in this area.

DO PETS LIKE SORGHUM IN THEIR FOOD?

Brizio Di Donfrancesco¹, Kadri Koppel¹, and Greg Aldrich²

¹*The Sensory Analysis Center, Department of Human Nutrition Department, College of Human Ecology;*

²*Department of Grain Science and Industry Department, College of Agriculture*

BACKGROUND AND PURPOSE: Kansas is the top producer of sorghum in the US. This crop grows well in arid climates with lower water requirements. To increase the use of sorghum, industries such as pet food can be targeted. To do this, understanding aspects such as sensory properties and pets' acceptance of the final products is essential. The objectives of this study were to investigate the sensory profile of dry dog food containing sorghum and to investigate dogs' acceptance of these products. **METHOD:** Three samples containing different sorghum fractions and a control sample containing mixed grains were manufactured. A trained human descriptive sensory panel described the sensory characteristics of the samples. In addition a total of 30 dogs of different size, age, and breed were selected for a one-bowl in-home palatability study to test pet acceptance of samples. The dogs were served each of the foods for 5 consecutive days in a randomized order.

RESULTS/FINDINGS: Differences among samples from the descriptive analysis were small and mostly related to the appearance and texture of the samples. Samples manufactured with sorghum and the control sample had similar flavor and aroma profiles. The palatability study with dogs showed no significant difference in dogs' acceptance between control and sorghum samples. **CONCLUSION:** The results from this study indicated that sorghum has no major effect on flavor or aroma properties of extruded pet foods. Further, the dogs seemed to like the foods manufactured with sorghum and other grains equally. Thus these results encourage the use of sorghum in dry dog food products.

SYSTEMATIC REVIEW AND META-ANALYSIS: IS LIFESTYLE MODIFICATION EFFECTIVE FOR GLYCEMIC CONTROL AMONG TYPE II DIABETIC ADULTS IN SOUTHEAST ASIA?

Zaw Wai Htoo¹, Wei-Wen Hsu², and Richard Rosenkranz¹

¹*Department of Human Nutrition, College of Human Ecology; Department of Statistics,* ²*College of Arts and Sciences*

BACKGROUND AND PURPOSE: Type 2 diabetes mellitus (T2DM) is a costly and burdensome disease; without proper glycemic control, severe life-threatening complications result. Although there are several systematic reviews on glycemic control and lifestyle modifications in a Western context, there is a dearth of evidence for Southeast Asians, who are at much greater risk of T2DM, and have differing patterns of diet, physical activity, and body composition. Therefore, we aimed to systematically review the effectiveness of lifestyle modifications for glycemic control in Southeast Asia. **METHOD:** Seven RCTs (including 679 participants) with interventions ≥ 8 weeks that compared HbA1c or blood glucose for lifestyle modification interventions versus control groups were identified from searches in 8 electronic databases. **RESULTS/FINDINGS:** Results showed a significant reduction in HbA1c% (mean difference, MD = -0.56%; 95% CI = -0.95,-0.16%; p = 0.006; n = 5 studies) and in blood glucose mg/dl (MD = -16.76 mg/dl; 95% CI = -31.36, -2.17 mg/dl; p = 0.02; n = 4 studies) over 3 months for diet (n = 2), exercise (n = 2), and general lifestyle modification interventions (n = 3) which ranged from 3 months to 6 months duration in countries of Southeast Asia: Thailand (n = 5) and Malaysia (n = 2). **CONCLUSION:** Overall, lifestyle modification interventions (dietary modification, physical activity, general lifestyle self-management/self-care interventions including behavior change) are effective for glycemic control among type 2 diabetes adult patients in the Southeast Asia context. Lifestyle interventions need to be strengthened within public health efforts to prevent T2DM complications in Southeast Asia.

IN-VITRO ACTIVITIES STUDIES OF D-K₆L₉ PEPTIDE DERIVATIVES

Jing Yu¹, Tej Shrestha², Hongwang Wang¹, Deryl Troyer², and Stefan H. Bossmann¹

¹*Department of Chemistry, College of Arts and Sciences;* ²*Department of Anatomy and Physiology, College of Veterinary Medicine*

BACKGROUND AND PURPOSE: The D-K₆L₉ (LK/LKkLlkKLLkLL) has recently attracted a lot of interest. It is a peptide that contains one third of D-amino acids, which help to increase the stability of the peptide in-vivo. D-K₆L₉ acts on the cancer cell membrane, inducing cell necrosis. In order to increase the tumor cell specificity and reduce side effects to healthy cells, we have introduced a urokinase consensus sequence to build a better delivery system. **METHOD:** In our early research, SA-D-K₆L₉-AS was found to exhibit more toxicity than D-K₆L₉ in various cancer cell lines. Based on this finding, we synthesized a “double” K₆L₉ peptide linked by the urokinase sequence SGRSA, bound to full generation PAMAM G5 dendrimers via Michael addition to maleimide units. The in-vitro activity of this delivery platform was evaluated by means of the MTT assay in B16F10 melanoma, 4T1 breast cancer, and GL26 glioma cancer cells. **RESULTS AND CONCLUSION:** We have developed a viable treatment platform for multiple solid tumors. The nano-size dendrimer particles can take “double” K₆L₉ peptides to tumor cells and release the toxic peptide fragment by urokinase cleavage successfully, which can improve the therapeutic effect. The advantage of this approach is that the cancer cells have little opportunity to develop drug resistance against D-K₆L₉.

DOES MODERATE INTENSITY EXERCISE IN THE POSTPRANDIAL PERIOD ATTENUATE THE INFLAMMATORY RESPONSE TO A HIGH-FAT MEAL?

Colby S Teeman¹, Stephanie P Kurti², Brooke J Cull¹, Sam R Emerson¹, Mark D Haub¹, and Sara K Rosenkranz¹
¹Department of Human Nutrition, College of Human Ecology; ²Department of Kinesiology, College of Human Ecology

BACKGROUND: Consuming a high-fat meal (HFM) may lead to postprandial lipemia (PPL) and inflammation. Postprandial exercise has been shown to effectively attenuate PPL. However, little is known about the impact of postprandial exercise on systemic inflammation and whether PPL and inflammation are associated. The purpose of this study was to determine whether moderate intensity exercise, performed 60 minutes following a true-to-life HFM, would attenuate PPL and inflammation. **METHODS:** Thirty-nine young adults (18-40yrs) with no known metabolic disease, were randomized to either a control group (CON) who remained sedentary during the postprandial period, or an exercise (EX) group who walked at 60% VO_{2peak} . Participants consumed a HFM of 10 kcal/kgbw, and blood draws were performed immediately before, 2hrs and 4hrs post-HFM to measure blood lipids and inflammatory markers. **RESULTS:** Postprandial triglycerides (TRG) increased from baseline to 4hr in the EX and CON groups (69.1 ± 48.5 and 82.9 ± 72.9 mg/dL respectively; $p < 0.001$), with no differences between groups ($p = 0.871$). In the EX group, IL-6 changed as a quadratic function (baseline = 0.76 ± 0.51 , 2hrs = 0.52 ± 0.37 , 4hr = 1.0 ± 0.71 pg/ml, $p = 0.005$), but did not change in the CON group. IL-6 was not different from baseline to 4hr between groups. Changes in TRG were associated with changes in IL-10 from 0-2hrs ($p = 0.007$), but were not associated with changes in any other inflammatory marker in the postprandial period ($p > 0.05$). **CONCLUSIONS:** Despite significant increases in PPL, postprandial exercise did not mitigate PPL nor inflammation following a HFM. These results indicate that in populations with low metabolic risk, PPL and inflammation following a HFM may not be directly related.

CHANGES IN INTAKE OF CVD-RELATED FOOD COMPONENTS ASSOCIATED WITH AN INTERVENTION TO REDUCE SEDENTARY TIME

Kelsey Casey¹, Sara Rosenkranz¹, Emily Mailey², Alyssa Baquero Garcia¹, Aaron Swank², and Richard Rosenkranz¹

¹Department of Human Nutrition, College of Human Ecology; ²Department of Kinesiology, College of Human Ecology

BACKGROUND: Insufficiently active individuals may have a high intake of food components thought to increase risk of cardiovascular disease (CVD). Lifestyle changes related to physical activity have been shown to occur alongside changes in diet, but it is unknown whether participating in an intervention to reduce sedentary behavior would be accompanied by dietary changes. **METHODS:** Insufficiently active women (N=49) working full-time sedentary jobs were randomized into one of two 8-week interventions that advised decreasing sedentary time at work. Dietary information was collected through 3-day food records at baseline and week 8. Fasting blood lipids and glucose, blood pressure, and waist circumference were assessed at each time point. **RESULTS:** At week 8, saturated fat intake was significantly associated with LDL ($r = 0.49$, $p < 0.01$) and total cholesterol ($r = 0.34$, $p < 0.05$). Changes in saturated fat consumption from baseline to week 8 were associated with changes in LDL ($r = 0.77$, $p < 0.01$) and total cholesterol ($r = 0.36$, $p < 0.05$). Consumption of sugar (baseline: 77.8 ± 37.9 g, week 8: 68.7 ± 35.7 g, $p < 0.01$) and sodium (baseline: 3104.0 ± 1051.3 mg, week 8: 2896.5 ± 1245.5 mg, $p = 0.05$) decreased from baseline to week 8. Changes in sodium consumption from baseline to week 8 were correlated with changes in LDL ($r = 0.36$, $p < 0.05$). **DISCUSSION:** Following an 8-week intervention to reduce workplace sedentary behavior, there were significant decreases in sugar and sodium intake. There were no changes in saturated fat or cholesterol, but there were associations between changes in saturated fat consumption and blood lipids, as well as between sodium consumption and LDL cholesterol. Future research should determine how combining dietary and sedentary behavior interventions impacts health outcomes.

MODULATION OF OMEGA-3 FATTY ACID PROFILE IN THE DUCK LIVER BY VARIOUS DIETARY FATS

Xi Chen¹, Xue Du², Jianliang Shen³, Lizhi Lu², and Weiqun Wang¹

¹Department of Human Nutrition, College of Human Ecology; ²Institute of Animal Husbandry and Veterinary Science, Zhejiang Academy Agricultural Sciences, Hangzhou, China; ³Zhejiang Zhuowang Agriculture Sci-Tech Limited Co., Huzhou, China

BACKGROUND AND PURPOSE: Omega-3 fatty acids, especially long-chain EPA and DHA, have been suggested to inhibit inflammation and prevent chronic diseases. To offer omega-3 fatty acid enhanced duck products, our previous studies found that dietary omega-3 fatty acids could be accumulated in the meat and eggs in a duck model. However, little study has been reported regarding omega-3 fatty acid profile in the liver. **METHOD:** 585 *Shan Partridge Ducks* were randomly assigned to five groups fed basal diet with or without 2% of flaxseed oil, rapeseed oil, beef tallow, or fish oil. In addition, a dose response study was further conducted for flaxseed and fish oil diets at 0.5%, 1%, and 2%, respectively. After five weeks, fatty acids were extracted from liver samples and analyzed by GC-FID. **RESULTS:** Total omega-3 fatty acids and the ratio of total omega-3/omega-6 significantly increased in flaxseed and fish oil groups. No significant change of omega-3 fatty acids was found in rapeseed and beef tallow groups. Short-chain omega-3 ALA-enriched flaxseed oil was efficiently converted to long-chain DHA in duck liver. The dose-response study further indicated that 1% of dietary flaxseed oil produced DHA synthesis to an extent similar to a 0.5% of dietary fish oil supplement. **CONCLUSION:** Our study showed the fatty acid profiling in duck liver after various dietary fat consumption, provided insight into a dose response change of omega-3 fatty acids, indicated an efficient conversion of short- to long-chain omega-3 fatty acid, and suggested a long-chain omega-3 fatty acid-enriched duck product for potential health benefits.

NITRITE ENHANCES MICROVASCULAR OXYGEN PRESSURE DYNAMICS IN HEALTHY RAT SKELETAL MUSCLE

Trenton Colburn¹, Scott Ferguson², Clark Holdsworth², Timothy Musch^{1,2}, and David Poole^{1,2}

¹Department of Kinesiology, College of Human Ecology; ²Department of Anatomy and Physiology, College of Veterinary Medicine

BACKGROUND AND PURPOSE: Chronic heart failure (CHF) and diabetes is associated with a reduced nitric oxide (NO) bioavailability resulting in an impaired O₂ driving pressure (PO_{2mv}: O₂ delivery – O₂ utilization), impaired metabolic control, resulting in exercise intolerance. Nitrite (NO₂⁻) supplementation augments NO bioavailability independent of the nitric oxide synthase (NOS) pathway. The potent NO donor sodium nitroprusside augments NO bioavailability, yet decreases arterial pressure (MAP) reducing its efficacy especially for patient populations. We hypothesized that local NO₂⁻ administration would elevate resting PO_{2mv} and slow PO_{2mv} kinetics (increased τ : time constant, MRT: mean response time) at the onset of muscle contractions. Both effects would act to enhance blood-myocyte O₂ flux and raise intramyocyte PO₂. **METHOD:** In 12 anesthetized Sprague-Dawley rats, PO_{2mv} of the circulation-intact spinotrapezius muscle was measured at rest and during 180 s of electrically induced twitch contractions (1 Hz) before and after superfusion of NaNO₂ (15 mg kg⁻¹). **RESULTS:** NO₂⁻ superfusion elevated resting PO_{2mv} (CON: 28.4 ± 1.1 vs NO₂⁻: 31.6 ± 1.2 mmHg, P ≤ 0.05), τ (CON: 12.3 ± 1.2 vs NO₂⁻: 19.7 ± 2.2 s, P ≤ 0.05) and MRT (CON: 19.3 ± 1.9 vs NO₂⁻: 25.6 ± 3.3 s, P ≤ 0.05) without changes in MAP (P ≤ 0.05). **CONCLUSION:** These results indicate that at rest and following the onset of muscle contraction, NO₂⁻ enhances the driving pressure of oxygen from the vasculature into the myocyte. Therefore, NO₂⁻ administration has the potential to decrease reliance upon non-oxidative energy supply and delay metabolically-induced development of exercise intolerance in health and disease.

Q-SPACE ANALYSIS OF LIGHT SCATTERING FROM GAUSSIAN RANDOM SPHERES

Justin Maughan, Chris Sorensen, Amit Chakrabarti, Yuli Heinson, and Will Heinson

Department of Physics, College of Arts and Sciences

BACKGROUND AND PURPOSE: A topic of current interest in the theory of light scattering is how irregularly shaped particles scatter light. This problem is not only of intellectual importance but also plays a role in climate models as most aerosol particles in the atmosphere have irregular shapes. Computational advancements over the last two decades have made theoretical studies of scattering from irregular shapes more practical. However, the results, although useful, yield phase functions that are not amenable to quantitative description or differentiation for different shapes. Thus there is a strong need for another point of view for scattering that will allow for such quantitative descriptions. **METHOD:** In the recent past we have developed a unique approach, Q-space analysis, which provides quantitative descriptions of the angular patterns of the light scattered by particles. Q-space analysis has been applied numerically to the light scattered by an irregular shape model known as Gaussian Random Spheres. **RESULTS/FINDINGS:** This work has continued the application of Q-space analysis to all types of particles. As with all shapes that Q-space has been applied to, we find quantifiable functionalities in the light scattering from Gaussian Random Spheres that would be difficult to uncover using traditional methods. **CONCLUSION:** We find quantifiable functionality furthering the belief that Q-space analysis can uncover universal description of light scattering for all particles.

LASER-INDUCED DISSOCIATION DYNAMICS AND VIBRATIONAL MOTION IN DIODOMETHANE

Balram Kaderiya, Yubaraj Malakar, Lee Pearson, Kanaka Raju Pandiri, Farzaneh Ziaee, Jyoti Rajput, Itzik Ben-Itzhak, Daniel Rolles, and Artem Rudenko

Department of Physics, College of Arts and Sciences

Laser-induced excitations of halomethane molecules have recently attracted a lot of attention since they often serve as prototype systems for laser-controlled chemistry (e.g., selective bond breaking or concerted elimination reactions), and are important for atmospheric chemistry¹. Here, we present the results of a time-resolved Coulomb explosion imaging experiment that maps ultrafast dynamics of bound and dissociating nuclear wave packets in a laser-excited diiodomethane (CH_2I_2). Measuring yields, kinetic energies and emission angles of coincident ionic fragments as a function of time delay between two 25 fs, 800 nm pump and probe pulses, we track the propagation of different dissociation pathways and visualize vibrational motion of the molecule. We observe signatures of both, bending and stretching vibrations of diiodomethane, and reveal the correlation between large-scale bending vibrations (the I-C-I “scissors mode”) and dissociation dynamics.

ELECTRON AND NUCLEAR DYNAMICS IN GOLD THIOLATED PROTECTED NANOCLUSTERS (Au₁₈SH₁₄, Au₂₅SH₁₈⁻¹) – A THEORETICAL INVESTIGATION.

Ravithree Senanayake and Christine Aikens

Department of Chemistry, College of Arts and Sciences

BACKGROUND AND PURPOSE: Designing efficient plasmon based water splitters are restricted by the lack of proper understanding of the plasmon enhanced photocatalysis. Researchers have pointed out different views about the direction of the electron flow within the semiconductor-metal composite system. Therefore, it is important to understand the fundamental physical principles like electron-nuclear dynamics in these systems and the correct relationship between effects and their characteristics of the metal semiconductor systems to model an efficient photocatalyst. The electron nuclear correlations in photoexcited systems can be treated with nonadiabatic dynamics. **METHOD:** In the present study, the electronic and nuclear dynamics of neutral and nonplasmonic nanoclusters Au₁₈(SH)₁₄ and Au₂₅(SH)₁₈⁻¹ [NH₄⁺] are studied to understand the electronic excited states and decay to lower energy states using molecular dynamics with nonadiabatic couplings. **RESULTS/FINDINGS:** Molecular dynamics and nonadiabatic coupling results have been obtained for Au₁₈SH₁₄ and Au₂₅(SH)₁₈⁻¹ [NH₄⁺] up to 5 ps and 3 ps respectively. Calculated excitation energy variations for both the clusters show that there are many possible state transitions that can take place in between the states which may lead to a decay to lower energy states. **FUTURE RESEARCH:** Compute the hopping probabilities for the neutral non plasmonic clusters to understand the electronic excited states and decay to lower energy states.

MACHINE LEARNING FOR SPATIOTEMPORAL PREDICTIVE ANALYSIS IN INFORMATICS APPLICATIONS

Heath Yates and William Hsu

Department of Computing and Information Sciences, College of Engineering

BACKGROUND AND PURPOSE: Many problems in agriculture, bioinformatics, and applied industry lend themselves naturally to modeling for spatial and spatiotemporal models for event detection. **METHOD:** A study was conducted which compared several models for pattern detection on a variety of problems to research the performance of these models given different statistical metrics. **RESULTS:** Current models and methods for hybridizing spatial, temporal prediction, pattern detection, and control involve multiple degrees of freedom with complex ramifications. We discuss the merits and drawbacks to the approaches we used. **CONCLUSION:** Our comparison of the models above suggest several ideas for modifications to standard approaches to the orthogonal methodologies used for time series, spatial interpolation, and pattern recognition.

HYDROGEOLOGIC CHARACTERIZATION OF ARKANSAS RIVER ALLUVIAL DEPOSITS USING ELECTRICAL RESISTIVITY IMAGING

Weston J. Koehn, Stacey E. Tucker-Kulesza, and David R. Steward
Department of Civil Engineering, College of Engineering

BACKGROUND AND PURPOSE: Groundwater depletion is an occurring problem in many areas of the world that requires the application of geophysical techniques in order to conceptualize the governing hydrogeologic processes. Groundwater withdrawals in excess of natural recharge have contributed to the declining water levels in the Ogallala Aquifer in many areas of Western Kansas. This study focuses primarily on characterizing the subsurface geology, as well as the processes controlling the groundwater-surface water interactions along the Arkansas River Alluvium in Kearny County Kansas, by coupling electrical resistivity tomography (ERT) with geology models developed for the study area. **METHODS:** Surface samples were collected from the Arkansas Riverbed and classified according to the Unified Soil Classification System. Soil permeability and specific gravity tests were also conducted to determine the samples hydraulic properties. The hydrogeologic properties of the riverbeds were explored using soil and geology maps, well and lithologic data, and time-lapse electrical resistivity measurements. **RESULTS AND CONCLUSION:** Well to well hydrostratigraphic cross sections show the different hydrogeologic units of well transects bisecting the Bear Creek Fault. Time-lapse ERT surveys show the redistribution and flux of water within the saturated and unsaturated zones of the Arkansas River Alluvial deposits. Results contribute towards the increased knowledge and understanding of the water balance issue affecting Western Kansas.

~WITHDREW~

PROGRESS TOWARDS THE TOTAL SYNTHESIS AND STRUCTURAL ELUCIDATION OF LAGUNAMIDE C

Chelsea Weese¹, Salvador Valdez², and Dr. Ryan Rafferty
Department of Chemistry, College of Arts and Sciences

BACKGROUND AND PURPOSE: Lagunamide C was isolated by Tan et al. from the cyanobacterium *Lyngbya majuscula* and was reported to have potent cytotoxicity ranging from 1.6 to 24 nM towards HCT8, A549, PC3, HCT8, and SK-OV3 cancerous cell lines. **METHOD:** Lagunamide C will be synthetically accessed via three modules: polyketide, pentapeptide, and commercially available sarcosine. While the absolute stereochemistry within the pentapeptide portion has been determined, three chiral centers within the polyketide module remain ambiguous. Eight diastereomers of the polyketide are required to accurately assign these centers, requiring a robust route and assembly of lagunamide C. **RESULTS/FINDINGS:** An analog of the first module, the synthesis, purification, and characterization of the polyketide, is in progress. This is being completed by promoting stereoselectivity through the usage of a chiral auxiliary, addition of an acyl group via acetylation, and forming the first stereocenter via a mixed aldol reaction. This stereocenter has been synthesized, but has yet to be determined. **CONCLUSION:** Completed work has lead to a promising start for the total synthesis of lagunamide C. The initial proposed route has proven successful thus far for the synthesis of an analog of the polyketide module. Future work will include continuing the synthesis of the analog of the polyketide fragment, involving Wittig reactions, selective cyclopropanation with tandem ring opening, and chiral reductions. After the completion of the analog polyketide fragment, the methods will be repeated for the synthesis of the target polyketide fragment. Each completed structure will be submitted for SAR studies to investigate possible activity.

ATOMIC FORCE MICROSCOPY STUDIES OF CONFORMATIONAL CHANGES IN PROTEINS AND PEPTIDES

Nicoleta Teodora Ploscariu and John Tomich

Department of Biochemistry and Molecular Biophysics, College of Arts and Sciences

Key processes related to development and tissue homeostasis depend on mechanical properties of the involved proteins and it has become possible to interrogate such processes in situ and with a spatial resolution down to a single molecule. Quantitative, fast, and nondestructive nanomechanical measurements of proteins are becoming possible too. **BACKGROUND AND PURPOSE:** Here, we present estimates of molecular stiffness and mechanical energy dissipation factors for some examples of proteins and peptides. To determine molecular stiffness and mechanical energy dissipation factors we used a model which we previously developed, based on measuring several resonance frequencies of an atomic force microscopy (AFM) cantilever in contact with either single protein molecule or peptides adsorbed on arbitrary surface. We used compliant AFM cantilevers with a small aspect ratio a ratio of length to width in air and in liquid, including biologically relevant phosphate buffered saline medium. **METHOD:** Data will be provided for a small peptide with the sequence (AcFLIVIGSII)₂KKKKKCCONH₂ which can adopt different secondary conformations on flat gold substrates depending on the dielectric of the bulk solvent and serve as a model system for both alpha helix and beta sheet. The results are obtained using AFM force spectroscopy measurements. **RESULTS AND CONCLUSION:** Having an accurate model for the cantilever in contact with these samples allows us to deconvolve the nanomechanical properties of the samples from the substrate and to study a large variety of peptide secondary structures folding using mechanical signatures and create a data base of mechanical signatures presented by different peptides.

CHARACTERIZING SOIL EROSION POTENTIAL USING ELECTRICAL RESISTIVITY

Md Zahidul Karim and Stacey Tucker-Kulesza

Department of Civil Engineering, College of Engineering

BACKGROUND AND PURPOSE: Scour is responsible for roughly 60% of all bridge collapses nationwide. Unlike coarse grained soils, there are very few available methods for predicting the rate of erosion, or erodibility, in fine grained soils and they are typically expensive. The erodibility of fine grained soils depends on various soil characteristics. Many of these characteristics also influence bulk electrical resistivity (ER) measurements. The objective of this study is to develop a two dimensional soil erosion profile by correlating the ER of soil with the erodibility measured in the Kansas State University Erosion Function Apparatus (KSU-EFA). **METHOD:** Ten bridge-sites around Kansas have been used for both ER surveys and subsurface sampling. Five soil samples were collected at each bridge site using two foot long thin walled Shelby tubes pushed continuously from the surface to ten feet with the aid of a drill rig. Each sample was tested for erodibility in the KSU-EFA and classified according to the Unified Soil Classification System. **RESULTS AND CONCLUSION:** Analysis of the results has shown that there is a correlation between ER and soil erodibility. As such, the in situ data obtained from an ER survey can be used to estimate soil erodibility for bridge design or to determine which existing bridges should be closed or closely monitored for scour potential during a flood event.

THE INFLUENCE OF WINDWARD PARAPETS ON THE HEIGHT OF LEEWARD SNOW DRIFTS AT ROOF STEPS

Christopher B. Goodale and Kimberly W. Kramer

Department of Architectural Engineering and Construction Science, College of Engineering

BACKGROUND AND PURPOSE: The American Society of Civil Engineers (ASCE) has developed standards for the design of snow loads that occur on buildings and structures today. These standards are found in the *Minimum Design Loads for Buildings and Other Structures*, or ASCE 7, and are based on the findings of case studies and other scientific tests. Design guidance on the possible reduction of leeward snow drifts at the junction of a roof parapet and a moderately sized roof step is limited and not specifically addressed in the ASCE 7. A literature review and parametric study were performed to evaluate the possible leeward snow drift reduction that could be seen at the junction of parapets and roof steps. **METHOD:** Leeward drift reduction was estimated using three different methods for various heights of parapets with varying upwind snow fetch distances and ground snow loads. **FINDINGS:** More drift reduction was seen with the taller parapets compared to the shorter parapets. Two of the three methods gave relatively similar reductions across the range of upwind fetch distances, while the other method gave larger reductions at shorter fetch distances, but returned similar results to the other two methods at larger fetches. Reductions were routinely small compared to the original leeward drift height. **CONCLUSION:** From the results, it could be suggested that parapets of this size do not provide significant leeward drift reductions. Further research could be done to expand the heights of parapets examined and to incorporate real-world testing.

A NEW CLASS OF DIRECT-DRIVE WIND TURBINES

Akanksha Singh and Behrooz Mirafzal

Department of Electrical and Computer Engineering, College of Engineering

BACKGROUND AND PURPOSE: The present day wind turbines (WT) either are indirect drives (ID) or direct drives (DD). An IDWT has the blade rotor connected to the generator through gearbox. A DDWT has its blade rotor connected directly to a permanent magnet (PM) generator. The wind farm developers incur a huge maintenance cost associated with gear boxes, but are unable to switch to DD because of the huge size and high capital cost associated with PM generators. This leads to increase in the cost of energy generated by wind. This research proposes a novel generator-converter system for DDWTs to decrease the capital cost and size associated with them and thereby decreasing the cost of energy generated. **METHOD:** The algorithm for the control of the inverter which converts the generator output to a regulated ac voltage for the grid is modified using MATLAB/Simulink to obtain flexibility to design the low cost generator. The generator is designed using MagneForce Finite Element software. **RESULTS/FINDINGS:** A design of a 1.5MW low-voltage generator was accomplished as a part of a DDWT. Comparing this design with an existing 1.5MW DDWT, 34% reduction in the total weight, and a reduction of 43% in PM which results in overall cost reduction of ~\$437,000. **CONCLUSION:** In the current market with high cost of PM being a concern, a reduced cost generator with the will have a huge commercial impact on the DDWTs. The proposed technology will result in less dependency on the imported market of PM and decrease in cost of energy generated from wind.

WAVELET ENHANCED CBLE SCORES TO IMPROVE P300 SPELLER PERFORMANCE

Md Rakibul Mowla¹, Jane E. Huggins², and David E. Thompson¹

¹Department of Electrical and Computer Engineering, College of Engineering; ²Department of Physical Medicine and Rehabilitation, University of Michigan, Ann Arbor

BACKGROUND AND PURPOSE: The performance of P300-based brain-computer interfaces (BCIs) is affected by several factors. Among them, latency jitter is prominent. To address this problem, classifier based latency estimation (CBLE) has been proposed in 2013 by Thompson et al. CBLE gives us classifier scores as a function of time shifts for each trial. Initial investigation has shown that those scores can be used to improve the BCI performance. Research is still ongoing to find the latency and amplitude of ERPs. In this work we have tried to improve the BCI performance for subjects with amyotrophic lateral sclerosis (ALS). **METHOD:** The data we used here were collected at the Department of Physical Medicine and Rehabilitation at the University of Michigan. Initially we used CBLE scores directly to train support vector machines (SVM). Then we applied different mother wavelets to improve performance further. **RESULTS:** The daubechies-4 mother wavelet performs the best of those tested. The method has been tested on data collected from 10 participants with ALS. Of these, the three with the lowest online performance saw the most improvement. For these three subjects, the improvements on day 1 were 46.25%, 15.30% and 3.21% respectively. **CONCLUSION:** The method helped to improve the accuracy of the BCI system for those users who have low online accuracy. Users with accuracies near 90% will not benefit.

VISUALIZATION INVESTIGATION OF DROPWISE CONDENSATION ON HYDROPHOBIC SURFACE IN MINI-GAPS

Xi Chen, Melanie Derby, Jordan Morrow

Department of Mechanical and Nuclear Engineering, College of Engineering

BACKGROUND AND PURPOSE: In the U.S. 80% electricity is generated in thermal power plants which are accounting for 40% nationwide fresh water intake. To reduce fresh water intake and hot water discharge which is a thermal pollution to aquatic lives, power plant are changing condenser from once through condenser or cooling towers to air cooled condenser. However, high ambient temperature in summer reduces cooling efficiency, which requires large footprint of air-cooled condenser. To reduce the size and therefore the expense of air cooled condenser, improved heat transfer coefficient is a decent solution. Dropwise condensation on hydrophobic surface has been found much higher heat transfer coefficient over filmwise condensation on hydrophilic surface. This research compares heat transfer performance between hydrophilic and hydrophobic surfaces as well as hydrophobic surface under different flow conditions i.e. steam mass flow rate and steam qualities to help optimise the design of air-cooled condenser to reduce the size and expense. **METHOD:** Experimental apparatus enable heat transfer measurement to find out heat transfer coefficient at different scenarios. Visualization analysis including droplet nucleation, coalescence and departure movements are captured and analyzed. Together the thermal and dynamic performance of condensation can be correlated. **RESULTS/FINDINGS:** Hydrophobic surface generated 3-5 times higher heat transfer coefficient especially at low qualities with low mass flow rate. On hydrophobic surface, mass fluxes and qualities change heat transfer coefficient through droplet departure size and frequency. **CONCLUSION:** Hydrophobic surface improves condensation heat transfer by removing liquid film on the surface. Increased mass flux and steam quality provide further enhancement by reducing droplet size and sitting time.

MORPHING CONTINUUM DESCRIPTION FOR BOUNDARY LAYER TRANSITION AND TURBULENCE

Louis Wonnell and James Chen

Department of Mechanical and Nuclear Engineering, College of Engineering

BACKGROUND AND PURPOSE: Turbulence, as a multiscale physical phenomenon, occurs in more than 90% of fluid flows and plays a crucial role in engineering designs and applications, e.g. aircraft and automobiles. Morphing Continuum Theory (MCT), as a multiscale theory, provides a comprehensive mathematical description for the turbulent boundary layer flow physics. This approach does not involve statistically averaging or filtering the flow equations. Therefore, MCT can produce a more accurate description of turbulence physics than the conventionally accepted methods, e.g. Reynolds-Averaged Navier-Stokes Equations (RANS) or Large Eddy Simulations (LES). The goal of this research is to demonstrate the computational benefits of MCT. **METHOD:** The problem of the transition mechanism in turbulent boundary layer flow over a flat surface is investigated numerically using Morphing Continuum Theory. New terms related to micro-properties of the fluid are formulated into the fluid solvers with appropriate boundary conditions. The success of capturing the wall-bounded disturbances leading to turbulence is shown to be a byproduct of the physics underlying the balance laws and constitutive relations introduced by MCT. Numerical results for the flat plate are compared with experimental results determined by the European Research Community on Flow, Turbulence, and Combustion (ERCOFTAC) database. **RESULTS:** The comparison between the simulation and experimental data show good agreements in the boundary layer flow of $Re=10^6$. Success in predicting conditions for turbulent and transitional (T2) flow suggests that MCT can capture the same physics for larger sets of initial conditions, boundary conditions, and flow geometries.

A VISUALIZATION TOOL FOR MULTIVARIATE PROCESS MONITORING IN DATA ABUNDANT ENVIRONMENT

Siim Koppel

Department of Industrial and Manufacturing Systems Engineering, College of Engineering

BACKGROUND AND PURPOSE: The monitoring of multiple quality characteristics is often processed by multivariate control charts such as Hotelling's T^2 . Unfortunately, an out-of-control point on a multivariate control chart does not reveal which quality characteristic is responsible for the problem without further analysis. A visualization tool is needed for users to make diagnostics-related decisions. **METHOD:** Using modified Sample Entropy algorithm and time-series modification to achieve mean shift and variance change detection, the tool uses spiderplots and trellis display arrangement to visualize the output of entropy for each variable on one graph. Simulation studies have been used to establish the thresholds for out-of-control signals. **RESULTS/FINDINGS:** The study provides a visualization tool to help analyze multivariate time-series data. Thresholds have been set to alarm out-of-control variables and identify the faulty variable quickly. **CONCLUSION:** Future studies include studies when the variables are correlated, finding the most important variables to avoid clogging the graph and possibilities to use the tool for real-time applications

A FUZZY MADM METHOD FOR UNCERTAIN ATTRIBUTES USING RANKING DISTRIBUTION

Mohammadhossein Amini and Shing I. Chang

Department of Industrial & Manufacturing Systems Engineering, College of Engineering

BACKGROUND AND PURPOSE: Decision making methods offer a systematic approach to reach a unique final solution by considering alternatives under a set of criteria or attributes. This research aims to overcome two concerns in current MADM (Multiple Attribute Decision Making) methods: uncertainty of attributes and sensitivity of ranking results. In the context of MADM many attributes maybe uncertain. Researchers have introduced methods such as using linguistic terms to tackle uncertainty problems. This research considers a new and simple way to model uncertainty. In addition, current MADM methods provide a final ranking of alternatives under consideration and, the final solution is based on a calculated number assigned to each alternative. Results have shown that the final value of alternatives may be close to each other, but current methods rank alternatives according to the final scores. It exhibits a sensitivity issue related to formation of the ranking list. **METHOD:** The proposed method is based on TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution). Uncertain attributes are represented by a range of values modeled by a triangular fuzzy membership function. Simulation runs are made to generate rank distribution of alternatives. **RESULTS AND CONCLUSION:** A case study of building design selection considering resiliency and sustainability attributes was presented to demonstrate use of the proposed method. The study demonstrated that proposed method can provide better decision option for designers due to the ability to consider uncertain attributes. In addition using the proposed method, a DM can observe the final ranking distribution resulted from uncertain attribute values.

3D PRINTED POINT-OF-CARE DEVICE FOR ANEMIA DIAGNOSIS

Kimberly Plevniak¹, Abby Hodges², Timothy Myers², and Mei He^{1,3}

¹Department of Biological and Agricultural Engineering, College of Engineering; ²Department of Science and Mathematics, MidAmerica Nazarene University; ³Terry C. Johnson Cancer Research Center

BACKGROUND AND PURPOSE: Anemia is considered to be one of the more serious global health concerns in today's age despite being (mostly) preventable. This condition is often seen in people who do not have easy access to healthcare. The purpose of this study was to develop a low cost device capable of point-of-care (POC) self-diagnosis of anemia. **METHOD:** A color-based assay and a 3D printed POC device capable of differentiating different hemoglobin levels in anemic patient blood was developed. Healthy and anemic status was simulated using hemoglobin protein(HgB). Device design was done using the engineering software Autocad following micro-scale hydrodynamic mixing principle. The split and recombinant flow design was incorporated for developing laminar flow mixing performance under capillary action, which allows self mixing of the indicator with HgB to produce color change results in the POC device. An iPhone 4s clip was designed and 3D printed to integrate the POC device with the smartphone camera. **RESULTS/FINDINGS:** The POC device integrated with the smartphone camera was able to detect disease status indicated by different color ranges under adequate mixing: 'healthy' (red-yellow) and 'anemic' (green-blue). The color-scale readout can be collected by the smartphone camera for transmission. **CONCLUSION:** This smartphone based 3D printed POC device represents a step towards cheaper and more accessible healthcare. With this device people who lack access to healthcare might be able to get an anemia diagnosis at a distance or at home. In the future we plan on clinically validating this study using healthy and anemic samples from KUMC.

ANALYTICAL AND FINITE ELEMENT BUCKLING SOLUTIONS OF SIMPLY SUPPORTED LAMINATED COMPOSITE COLUMNS AND WIDE PLATES UNDER AXIAL COMPRESSION

Rund Al-Masri and Hayder Rasheed

Department of Civil Engineering, College of Engineering

The research on the mechanics of laminated composites is ever growing due to the versatility and complexity of the material behavior. In this work, a generalized analytical formula for buckling of simply supported laminated composite columns and wide plates under axial compression is developed. The Rayleigh–Ritz method was used to obtain the buckling formula. Axial, coupling and flexural rigidities in 1D are determined using the static condensation approach starting with the 3D rigidity matrix. Moreover, finite element models for the columns and wide plates are developed using the commercial software ABAQUS. In addition, a program is built to generalize the analytical solution to different types of composite materials, orientations and number of plies. A comparison between the analytical and finite element (numerical) solutions is made and had yielded good agreements regardless of the complexity of the composite layups used.

A GAIT ANALYSIS STUDY USING THE MICROSOFT KINECT

Behnam Malmir and Lucas Verschelden

Department of Industrial and Manufacturing Systems Engineering, College of Engineering

BACKGROUND AND PURPOSE: Gait analysis can be used to study and analyze people's walking patterns. The Microsoft Kinect is proposed to record the coordinates of joints of human skeleton. This study aims to convert coordinates into gait parameters for various applications, such as elderly people fall prediction, physical therapy, and sport science. **METHOD:** Our research was performed by analyzing small populations and focuses on the ability to draw conclusions from the data. This can be achieved by using sample entropy to detect pattern changes. Once Kinect coordinates are converted into gait parameters, such as hip tilt, knee angle, or shoulder tilt, it allows for tracking problems in the person's gait. **RESULTS/FINDINGS:** Our current research has shown that it is simple to convert data from Kinect into gait parameters. We are working on detecting changes of the same person over time due to aging or progress in physical therapy. **CONCLUSION:** The proposed study aims to discover meaningful statistics and detect methods that would allow for the possibility of gait recognition for various applications. Expected research results may lead to the distinguishment between injured and healthy subjects allowing for improved treatments and early diagnoses.

CARBON NANOTUBE-SUPPORTED CATALYSTS FOR FISCHER-TROPSCH SYNTHESIS

Xu Li, Haider Almkhelfe, and Placidus B. Amama

Department of Chemical Engineering, College of Engineering

BACKGROUND AND PURPOSE: The transformation of syngas into hydrocarbons via a catalytic conversion process known as Fischer-Tropsch (FT) synthesis is of great interest due to the increasing demand for clean and renewable fuels. The goal of this study is to exploit advances in nanotechnology in order to develop new FT catalysts with superior performance than current catalysts. The conventional FT synthesis catalyst typically consists of an active phase (Fe or Co) that is supported on either SiO₂ or Al₂O₃. There are significant issues associated with these oxide supports that have so far hindered the improvement of FT synthesis process. First, the weak catalyst-SiO₂ interactions usually lead to agglomeration of the oxide catalyst while the strong catalyst-Al₂O₃ interactions result in decreased reducibility of the catalyst. Second, the conventional supports have pores that are still largely limited to sub-nanometer scale, which limits mass transport of the reactants and products inside the catalyst matrix. Third, the heat produced during the exothermic FT synthesis reaction is not well dissipated in the presence of SiO₂ and Al₂O₃ due to their relatively poor thermal conductivity, resulting in a temperature gradient in the packed bed reactors. **METHOD:** To mitigate these serious challenges and improve the FT synthesis process, we are developing a 3D carbon nanotube (CNT)-based catalyst support via sol-gel process. **RESULTS AND CONCLUSION:** CNT support is characterized by high mesoporosity, high thermal conductivity, and favorable catalyst-support interactions. The activity and selectivity of the synthesized CNT-supported catalysts in the FT synthesis process are expected to be higher than those of conventional catalysts.

CONTROLLING LIGHT IN SPACE, TIME AND COLOR FOR ADVANCED LASER-BASED MANUFACTURING

Xiaoming Yu, Shuting Lei, and Xinya Wang

Department of Industrial and Manufacturing Systems Engineering, College of Engineering

BACKGROUND AND PURPOSE: Lasers have been widely used as a machining tool in manufacturing processes such as cutting, drilling and welding. Compared to traditional manufacturing methods, laser machining shows advantages including the ability to process a wide range of materials, non-contact and stress-free treatment, and the absence of tool wear. However, new manufacturing processes are needed in order to meet demanding manufacturing requirements exemplified by the emerging fields of nano and 3D machining. This research is aimed at developing novel laser/optics technologies for laser-based manufacturing, and improving current manufacturing processes in terms of machining resolution, energy efficiency, and overall robustness. **METHOD:** This research is conducted through laser machining experiments with the use of pulsed (femtosecond and nanosecond) laser systems. Spatial light modulators (SLMs), pump-probe techniques and harmonic generations are used to control the laser beams in space, time and spectrum. Experimental results are compared with results from mathematical modeling and computer simulation. **RESULTS AND CONCLUSION:** In the spatial domain, the result shows that using Bessel beams instead of commonly used Gaussian beams can greatly increase depth-of-focus, ensuring consistent machining quality in the processing of materials with uneven surfaces. In the temporal and spectral domains, the result shows that materials' damage threshold can be reduced by a pair of ultraviolet and infrared laser pulses, leading to improved machining resolution and reduced energy consumption. These results indicate the great potential of lasers as a manufacturing tool once fully-optimized in multiple dimensions, and a future when lasers would be used as naturally and efficiently as mechanical tools are used today.

DIVERGENCE IN PHENOTYPES AND GENOMES AMONG ECOTYPES OF A WIDESPREAD GRASS, BIG BLUESTEM, ACROSS A GREAT PLAINS' CLIMATE GRADIENT

Matthew Galliard¹, Paul St Amand², Jesse Poland³, Nora M. Bello⁴, Sofia Sabates¹, Theodore J. Morgan¹, Mary Knapp⁵, Sara G. Baer⁶, David Gibson⁶, Brian R. Maricle⁷, and Loretta Johnson¹

¹Division of Biology, College of Arts and Sciences; ²USDA, Hard Winter Wheat Genetics Research Unit, Kansas State University; ³Department of Plant Pathology, College of Agriculture; ⁴Department of Statistics, College of Arts and Sciences; ⁵Department of Agronomy, College of Agriculture; ⁶Plant Biology and Center for Ecology, Southern Illinois University; ⁷Department of Biological Sciences, Fort Hays State University

BACKGROUND AND PURPOSE: Local adaptation is fundamental to evolution, conservation, and climate change. *Andropogon gerardii*, a major forage grass, represents ~ 70% of prairie biomass and has a wide geographic distribution across a precipitation gradient (500-1200 mm/yr, western KS to IL), we expect adaptive variation in response to climate. Objectives are to use reciprocal gardens to investigate differences among ecotypes in phenotypic traits, gene expression (transcription), and genetic divergence. Ecotypes (CKS, EKS, and SIL, derived from central, eastern KS and southern Illinois, respectively) were reciprocally planted in Colby, Hays, and Manhattan, KS, and Carbondale, IL. **METHODS:** We evaluated ecotype differences in vegetative and reproductive traits, utilized RNASeq to investigate differential gene expression and Genotyping-by-Sequencing (GBS) to investigate genetic divergence, to characterize locally adapted ecotypes. **RESULTS:** Canopy area and height increased from west to east, with no evidence for ecotype differences in western KS. In Carbondale and Manhattan, CKS ecotype flowered 20 days earlier than other ecotypes. Morphology was primarily correlated with seasonal mean temperature and seasonal mean precipitation. Differential gene expression identified genes involve with water stress upregulated in SIL. Using UNEAK, we identified 4,641 Single Nucleotide Polymorphisms (SNP). Outlier analysis identified 373 SNPs showing divergent selection, putatively associated with seasonal diurnal temperature variation and seasonal precipitation. SNPs were mapped to *Sorghum bicolor* genome and TASSEL used to associate genotype to phenotype. Candidate genes identified include: glutamate synthase (nitrogen assimilation), GA1 (internode length), and WUSCHEL transcription factor (development). **CONCLUSION:** Results provide insight into candidate genes responsible for adaptive divergence and inform restoration in future climates.

EVALUATING ZOYSIAGRASS-TALL FESCUE MIXTURES IN THE TRANSITION ZONE

Mingying Xiang¹, Jack Fry¹, Cole Thompson², and Megan Kennelly³

¹Department of Horticulture, Forestry and Recreation Resources, College of Agriculture; ²Horticulture and Crop Science Department, California Polytechnic State University, San Luis Obispo, CA; ³Department of Plant Pathology, College of Agriculture

BACKGROUND AND PURPOSE: Water conservation is an increasingly important factor when selecting turfgrasses throughout the U.S. Zoysiagrass (*Zoysia japonica*), a warm-season grass, is more drought resistant than cool-season grasses. However, there is resistance on the part of homeowners, and some golf course managers, to use zoysiagrass due to its brown color when dormant. Our overall goal is to evaluate the best method of establishing a perennial mixture of seeded zoysiagrass and tall fescue (*Festuca arundinacea*), a cool-season grass, which could improve stand performance and add winter color to the sward. The objective of this study was to evaluate tall fescue seeding rates and seasonal timings for establishing a mixed stand with seeded zoysiagrass. **METHOD:** Plots were arranged in a split-plot. Mowing height (1.9 or 5cm) was the whole-plot treatment factor and tall fescue seeding rates and timings were arranged in a two-way factorial in sub plots. 'Compadre' zoysiagrass was seeded in all plots at 49 kg pure live seed (PLS) ha⁻¹ in June 2015. 'Corona' tall fescue was seeded in sub-plots at 98, 195, or 390 kg PLS ha⁻¹ either in June 2015 with the zoysiagrass seed, or in September 2015 into established zoysiagrass. **RESULTS AND CONCLUSION:** In mid-November 2015, percentage green coverage in the mixtures ranged from 17% to 45%, whereas a monostand of 'Meyer' zoysiagrass had only 11% green coverage. Preliminary results indicate that seeding tall fescue at 390kg ha⁻¹ in September into established zoysiagrass provided higher levels of green coverage the first autumn following seeding compared to other seeding rate by timing treatment combinations.

UNDERSTANDING BIOCHEMICAL CONTRIBUTIONS TO RESILIENCE OF SOIL ORGANIC CARBON SEQUESTRATION IN SOILS FROM CONTRASTING AGROECOSYSTEMS

Dorothy S. Menefee, Ganga M. Hettiarachchi, Pavithra S. Pitumpe Arachchige, and Charles W. Rice
Department of Agronomy, College of Agriculture

Climate change has the potential to alter soil microbial respiration rates and soil carbon storage patterns. A significant loss of soil carbon due to climate change would be a significant feedback loop and it is important to understand how soil carbon cycling responds to altered climate. This study was conducted to learn how altered climate regimes affect soil microbial populations and biodiversity. This was conducted via a 180 day incubation study with a factorial design using four factors. The treatments were: soil type, temperature regime, moisture regime, and aggregation. The soil type treatment (4 levels) consisted of four soils: Oxisol/No-till, Oxisol/Tilled, Mollisol/No-Till, and Mollisol/Tilled. The temperature treatments (3 levels) consisted of 12°C, 24°C, and 36°C. The moisture treatments (2 levels) consisted of field capacity and 80% of field capacity. The aggregate treatments (2 levels) consisted of <4mm sieved (preserved macroaggregates) and <4mm aggregates ground to <0.25mm and sieved (destroyed macroaggregates). Soil microbial populations were characterized using Phospholipid and Fatty Acid Analysis (PLFA). Results will be presented in this oral presentation. The ultimate desired outcome of this study is to improve our understanding of soil carbon dynamics; both to improve understanding of climate change and to be able to make better land-management recommendations for improving soil C sequestration.

ESTIMATE CONTRIBUTIONS OF KANSAS PRESCRIBED PASTURE BURNING TO AMBIENT PM_{2.5} THROUGH SOURCE APPORTIONMENT USING UNMIX RECEPTOR MODEL

Zifei Liu¹, Yang Liu¹, Ronaldo Maghirang¹, Daniel Devlin², and Carol Blocksome³

¹*Department of Biological and Agricultural Engineering, College of Engineering;* ²*Department of Agronomy, College of Agriculture;* ³*Department of Horticulture, Forestry and Recreation Resources, College of Agriculture*

BACKGROUND AND PURPOSE: Prescribed pasture burning in Flint Hills region is a long-standing practice in eastern Kansas used to enhance the nutritional value of native grasses, while the smoke from burning increases PM_{2.5} concentrations to this area. To evaluate the effect of burning, the typical Chemical Mass Balance receptor model requires source profiles which are hard to gain during burning activities. The objective is to estimate the contributions of prescribed pasture burning to local ambient PM_{2.5} in Kansas. **METHOD:** Source apportionment analysis was applied in the Unmix receptor model to the 2002-2014 speciated PM_{2.5} data from the IMPROVE sites in the center of Tallgrass, Kansas. **RESULTS/CONCLUSION:** The results of this study identified five source categories that contribute to local ambient PM_{2.5}: nitrate/agricultural (22%), vegetative burning (5%), secondary organic aerosol (29%), sulfate/industrial (30%), and crustal/soil (14%). Concentration spikes were observed during burning activities which mainly happened in April. In April, the contributions of vegetative burning and secondary organic aerosol increased to 0.93 µg/m³ (11%) and 3.79 µg/m³ (49%), respectively, which in total contributed 39% of the average PM_{2.5} concentration in burning season. The estimated contribution of secondary aerosols was four times higher than that of primary aerosols which highlighted the importance of secondary aerosols in smoke management.

IMPROVED DISEASE RESISTANCE IN TRANSGENIC WHEAT USING ANTIMICROBIAL PEPTIDE GENES.

Jordan Brungardt¹, Bin Tian¹, Hyeonju Lee¹, Zhao Peng¹, Frank White², and Harold Trick¹

¹Department of Plant Pathology, College of Agriculture; ²Department of Plant Pathology, University of Florida

BACKGROUND AND PURPOSE: Antimicrobial peptides (AMPs) are produced by a wide variety of species and are essential components of defense against pathogens. Several classes of oligopeptides have strong antimicrobial activity and have been expressed in transgenic plants to confer disease protection. **METHOD:** Here, we report the transgenic expression of three oligopeptides with antimicrobial activity in transgenic wheat (*Triticum aestivum*) under the control of the maize ubiquitin promoter. These genetic engineered events were challenged with *Xanthomonas translucens*, the causal agent of bacterial leaf streak, and Hessian fly (*Mayetiola destructor*), a parasitic insect of wheat. The oligopeptide expressing wheat was challenged with Hessian fly because bacteria within the gut of several other plant parasitic insects have been shown to be essential for nutrient uptake. **RESULTS:** Preliminary results indicated that the transgenic lines inhibited the growth of *Xanthomonas translucens* and retard larval development of Hessian fly feeding on transgenic lines compared to non-transgenic controls. We will report progress on current screening of transgenic wheat lines and demonstrate the potential of these AMPs as new candidates for plant protection.

YIELD POTENTIAL AND NUTRITIONAL QUALITY ATTRIBUTES IN ALS HERBICIDE RESISTANT SORGHUMS

Dilooshi Weerasooriya¹, Ananda Bandara², Scott Bean³, Floyd Dowell³, Kamaranga Peiris³, and Tesfaye Tesso¹

¹Department of Agronomy, College of Agriculture; ²Department of Plant Pathology, College of Agriculture; ³USDA-ARS, Center for Grain and Animal Health Research, Manhattan, KS

BACKGROUND AND PURPOSE: Developments in weed control technology for sorghum (*Sorghum bicolor* (L.) Moench) have not kept pace with those in other economically important crops. As a result sorghum has lost tremendous acreage to crops that offer better weed control options. The discovery of herbicide resistance mutation in wild/weedy sorghum species led to the development of herbicide resistant sorghums. Further research over the last several years resulted the production of agronomically adapted seed and pollinator parent lines with ALS resistant trait. In this study we report agronomic potential and nutritional properties of new ALS resistant sorghum inbreds and hybrids. The study also addresses some of the public concerns on the possible undesirable effects of genome dragging from resistant donor parents. **METHODS:** Thirty-three inbreds and 30 hybrids developed through crosses between ALS resistant and susceptible lines were evaluated in replicated plots along with commercial checks. Data were collected on various agronomic parameters as well as nutritional and grain quality attributes. **RESULTS/CONCLUSIONS:** Resistant hybrids were shown to have similar adaptation and yield potential as susceptible regular hybrids. Few of the resistant inbreds and hybrids have higher protein content while the majority have nutritional attributes (protein, starch, fat and ash) and mineral profiles (P, K, Ca, Mg, Zn, Fe, Cu and Mn) comparable to that of regular lines and hybrids. While, interveinal chlorosis is observed on young seedlings of some ALS resistant inbreds and hybrids, these phenotypes disappear at advanced seedling stage and seem to have little or no effect on final yield and other crop parameters.

LONG-TERM TRENDS OF NITROGEN CONCENTRATION IN TALLGRASS PRAIRIE STREAMS

James Guinnip and Walter Dodds

Division of Biology, College of Arts and Sciences

BACKGROUND: Nitrogen is a common limiting nutrient in aquatic ecosystems leading to unwanted algal growth and toxicity at high levels. Nitrogen enrichment can be driven by human land-use, atmospheric deposition, or natural processes within a drainage basin. Natural processes of nitrogen enrichment in streams are temporally variable due to seasonal cycles of weather and biological productivity. Unfortunately, little is known about long-term variation of nitrogen concentration that may be driven by climatic changes or delayed response to an environmental disturbance, even though long-term trends can identify processes influencing nitrogen concentration that may be undetectable by observation over a shorter timeframe. **METHOD:** Long-term data (1983 – 2013) on concentrations of nitrogen (nitrate, ammonium, and total nitrogen) were taken from the Konza Prairie Biological Station. Monthly averages of nitrate, ammonium, and total nitrogen were calculated to examine trends in nitrogen concentration over a 30-year period. **RESULTS:** Despite large variation within years, nitrate and total nitrogen appear relatively steady through time. However, concentration of ammonium exhibits a positive trend at multiple sampling locations. Further analyses will integrate data from a larger number of sampling locations to identify environmental variables influencing observed trends. **CONCLUSION:** Short-term variability would have masked long term trends of increasing ammonium. Thus, analysis of long-term trends in nitrogen concentration elucidates processes affecting nitrogen availability that may be unseen by research conducted over a shorter timespan. This provides a more comprehensive understanding of variability in tallgrass prairie streams and allows researchers to relate nutrient concentration in streams to long-term processes of environmental change.

UPTAKE, TRANSLOCATION AND METABOLISM OF DICAMBA IN DICAMBA-RESISTANT KOCHIA FROM KANSAS

Junjun Ou¹, Phillip W. Stahlman², and Mithila Jugulam¹

¹*Department of Agronomy, College of Agriculture,* ²*Agricultural Research Center, Hays, KS*

BACKGROUND AND PURPOSE: Kochia (*Kochia scoparia*) is one of the most troublesome broadleaf weeds throughout the western Great Plains including Kansas. Recent evolution and spread of dicamba resistance in kochia has become a major concern, because of the lack of herbicide options for managing this weed. However, the mechanism of dicamba resistance in kochia populations from KS remains unknown. The objective of this study was to determine the mechanism(s) of dicamba resistance in kochia. **METHOD:** Dicamba dose-response as well as ¹⁴C dicamba uptake, translocation and metabolism experiments were conducted using homogeneous lines of dicamba-resistant (DR) and -susceptible (DS) kochia in controlled environment greenhouse or growth chambers. **RESULTS AND CONCLUSION:** Dose-response results indicated that the DR kochia was 17 times more resistant to dicamba when compared to DS kochia. Furthermore, there was no significant difference in uptake/translocation of dicamba between DR and DS kochia. Likewise, there was no difference in metabolism of dicamba between DR and DS kochia. These results suggest that the dicamba resistance in this kochia population is not due to non-target site mechanisms. Studies are in progress to explore possible target site resistance mechanism(s) in DR kochia. Understanding the mechanism of herbicide resistance will help suggest prudent weed management tactics to minimize further evolution and spread of herbicide resistance.

EXAMINING THE EFFECTS OF KNOWLEDGE, ENVIRONMENTAL CONCERN, ATTITUDES AND CULTURAL CHARACTERISTICS ON KUWAITI CONSUMERS' PURCHASING BEHAVIOR OF ENVIRONMENTALLY SUSTAINABLE APPAREL

Hayat Abloushy and Kim Hiller Connell

Department of Apparel, Textiles, and Interior Design, College of Human Ecology

BACKGROUND: This study is being conducted because Kuwait is a large consumer market for apparel goods and there is a gap in literature on sustainable apparel with regards to Kuwait. **PURPOSE:** The purpose of this study is to inquire about the knowledge, attitudes, and behaviors of Kuwaiti female consumers regarding environmentally sustainable apparel. **METHOD:** This study uses a quantitative survey and qualitative interviews in order to acquire data from Kuwaiti females aged 18-65. This mixed method approach includes a survey instrument featuring five different pre-established scales to acquire data through quantitative methods on a population of Kuwaitis acquired through snowball sampling. The study also includes semi-structured interviews with Kuwaiti females. **RESULTS/FINDINGS:** Data will be analyzed by time of research presentation. Based on the literature review, the data obtained from this study could be used by government agencies in Kuwait to understand where Kuwaitis' are in terms of education and feelings about sustainability. The study will also provide educators with data through which to tailor curricula towards the knowledge, attitudes, and beliefs of Kuwaiti nationals. **CONCLUSION:** It is anticipated that this study lies in its ability to positively impact the environment. the data within provides use to policy makers and market actors. Ultimately, environmentalism is meant to produce a better world for us in the present. It is also to encourage future generations to do the same and continue a perpetual cycle where the human species can continue to exist, without current levels of environmental exploitation leading to catastrophic consequences.

ADVICE FROM THE EXPERIENCES OF PARENTS WITH A CHILD WITH DOWN SYNDROME

Adam Cless, Ellen Bodine, Ashley Schmelzle, Laura Farkas, and Briana Nelson Goff

School of Family Studies and Human Services, College of Human Ecology

BACKGROUND AND PURPOSE: Historically from the perspective of the family, research regarding Down syndrome has focused on the negative aspects of raising a child with Down syndrome. Typically, the research has centered around developmental delays instead of the possibilities that children with Down syndrome can experience. In the present study, we attempt to focus on the positive, strengths-based aspects of Down syndrome that will help future parents. Specifically, we analyzed the advice that parents of children with Down syndrome would give to other families facing the same situation. **METHOD:** The stories, experiences, and advice of parents were collected through thematic coding analysis by a research team. The researchers reviewed data from a national database of parent experiences involving 645 parents. Thematic and consensus coding were conducted to determine specific themes from the data. **RESULTS/FINDINGS:** Our findings from this research project have yielded a range of advice themes dealing with future planning for their child, working with medical professionals, and enjoying the little moments along the way. **CONCLUSION:** This research has future implications with regards to positive parenting practices as well as future outcomes for children with Down syndrome. Consequently, the research will provide future application with regards to theory-based approaches into interventions aimed at the strengths of the child within the context of family.

ON-SITE AND ONLINE GIRL SCOUT LEADER WELLNESS TRAINING FOR PHYSICAL ACTIVITY IN TROOP MEETINGS

Brooke J. Cull¹, Sara K. Rosenkranz¹, Cassandra K. Knutson¹, David A. Dzewaltowski², and Richard R. Rosenkranz¹

¹Department of Human Nutrition, College of Human Ecology; ²Department of Kinesiology, College of Human Ecology

PURPOSE: Health promotion efforts in Girl Scouts (GS) have been successful in improving physical activity (PA) opportunities during troop meetings. The present study sought to evaluate the effectiveness of on-site and online leader wellness training on troop meeting PA and sedentary behavior. **METHODS:** Eighteen GS troops were randomized to on-site (n=9; 93 girls) or online (n=9; 88 girls) leader training. At baseline (January-February), leaders self-reported PA (scale 0-4; 0= no PA, 4= >30min PA) and sedentary behavior during one meeting, and girls from on-site trained troops also wore Actical accelerometers. During trainings, leaders set troop-specific wellness implementation goals in five areas, including increasing PA and reducing sedentary behavior. Leaders received ongoing feedback and resources to assist with meeting implementation goals. On-site leaders attended implementation goal setting and wellness trainings in person, while online leaders received training via website and emails from researchers. Following the training sessions (April-May), a post-intervention assessment was conducted, where the PA assessments were repeated. **RESULTS:** At baseline, there were no differences between groups for self-reported implemented PA ($p=0.81$) or sedentary behavior ($p=0.66$). From baseline to post-intervention, on-site troops increased PA more than online troops (on-site= $+1.0\pm 1.0$, online= -0.17 ± 0.75 ; $p=0.037$). Changes in sedentary behavior did not differ between groups ($p=0.49$). After training, on-site troops increased accelerometer (Actical)-measured steps per meeting ($1,468\pm 2,233$ steps; $p=0.012$), as well as moderate-to-vigorous PA (17.4 ± 21.7 min; $p=0.012$), while reducing sedentary behavior (-13.2 ± 15.1 min; $p=0.025$). **CONCLUSION:** Wellness goal training delivered on-site led to improvements in both PA and sedentary behavior during meetings, thus improving the health-promoting aspects of the GS setting.

INJURY RELATED ISSUES AMONG FEMALE FIREFIGHTERS: A QUALITATIVE STUDY

Brittany S. Hollerbach¹, Katie M. Heinrich¹, and Sara Jahnke²

¹Department of Kinesiology, College of Human Ecology; ²NDRI, Center for Fire, Rescue & EMS Research

BACKGROUND: Firefighting is a dangerous occupation. National firefighter injury rates have been well documented for males, however there are few data regarding females, (3-5% of the fire service). Despite increased attention to health/wellness, there remains little focus on how the demands of this occupation uniquely affect women. **PURPOSE:** We explore female firefighters' perceptions, attitudes, and experiences with injury. **METHODS:** A national sample of 68 current female firefighters and fire service leaders participated in focus groups and key informant interviews. The participants were asked about perceived threats to safety and standard operating procedures (SOPs) that might lead to injury with regard to gender differences in the fire service. A thematic qualitative analysis was conducted by two researchers. **RESULTS:** Six key themes were identified related to injury: 1) females were in a male-dominated field, 2) females experienced harassment, 3) males and females experienced the same rates/types of injury, 4) fire service training was inadequate for females, 5) females experienced ill-fitting gear, and 6) females lacked functional techniques/muscular endurance. Both chronic and acute injuries and their causes were discussed. There were benefits (ie: consuming less tank air) and challenges (ie: smaller stature) of being a female firefighter. **CONCLUSION:** Addressing the issues identified in this study will require policy change for injury prevention for all firefighters. The analysis suggests the fire service must include female-specific training for drills and fitness training, including strength training, with a consideration for smaller anatomy/musculature. SOPs must be reviewed for relevance to today's fire service personnel with the goal of better protecting our communities.

PERCENTAGE OF CROSSFIT WORKOUTS AS INTERVALS

Victor Andrews, Brittany Hollerbach, and Katie Heinrich

Department of Kinesiology, College of Human Ecology

BACKGROUND AND PURPOSE: CrossFit (CF) is defined as constantly varied, high intensity, functional movement. CF research is relatively new and in the past has commonly been grouped with High Intensity Interval Training (HIIT). In newer research CF has been categorized as High-Intensity Functional Training (HIFT): a training modality that emphasizes functional movements that can be modified to any fitness level and elicit muscle recruitment, thereby improving cardiovascular endurance, strength, and flexibility. HIIT is defined as alternating work and rest periods within a workout session. Although both are considered high intensity exercise, it is unclear to what extent they overlap each other. The purpose of this study was to determine what percentage of CF workouts are interval based. This determination is necessary to categorize past and future research of CF. **METHODS:** This study examined six months of daily workouts posted by CrossFit Headquarters (CFHQ) online between April-September 2015. Each workout was analyzed to evaluate whether they meet the HIIT standards by looking at work to rest ratios within a planned exercise routine. A one-way ANOVA was used to determine difference by month of programming. **RESULTS:** CFHQ programming contained less than 10% workouts meeting interval ratios per month. No significant differences were found between months. **CONCLUSION:** A minimal percentage of CF workouts contained intervals which did not significantly vary over time. With definitions in mind, CF seems to share more characteristics with HIFT. Research results from CF training programs may not be comparable to those from HIIT. This optimized categorization allows for more standardized definitions to increase validity.

WHAT'S IN A MUGSHOT: VISUAL CHARACTERISTICS NEWSPAPER MEDIA EMPHASIZE BASED ON RACE AND GENDER

Alayna Fahrny

Department of Sociology, Anthropology, and Social Work, College of Arts and Sciences

BACKGROUND AND PURPOSE: The media has a substantial role in providing knowledge about criminality to the public. Previous research has demonstrated that many media representations of crime and criminality perpetuate racial stereotypes and myths. The current study examines photographs in newspapers to investigate if a person of color has a higher chance of being presented by their mugshot over White individuals in crime stories. In addition the analysis examines how female offenders are presented in newspaper crime stories compared to men. To date, there has been no published research on the influence gender and race has on mugshot portrayals in newspaper media. **METHOD:** The current study addresses this gap through an ethnographic content analysis of newspaper crime stories from widely circulated newspapers published between August 1, 2014 and October 31, 2014. The analyses are also informed by social constructionism and labeling theory. **RESULTS/FINDINGS:** Results will verify if a person of color has a higher chance of being presented by their mugshot over White individuals in crime stories. The analysis will also verify how female offenders are presented in newspaper crime stories compared to men. **CONCLUSION:** These results indicate if there are disparities in how individuals are or are not differently represented in newspaper media representations of crime in relation to their race and gender.

HOPE, COPING, AND RELATIONSHIP QUALITY IN MOTHERS OF CHILDREN WITH DOWN SYNDROME

Jessica High, Briana S. Nelson Goff, and Jared Durtschi

School of Family Studies and Human Services, College of Human Ecology

BACKGROUND AND PURPOSE: Parenting a child with Down syndrome may pose unique challenges for parents' relationship quality. The purpose of this study was to investigate coping and hope as factors that affect intimate partner relationship quality in mothers of children with Down syndrome. **METHOD:** Structural equation modeling was used with a sample of 351 mothers of children with Down syndrome to test if hope mediated the association between various coping behaviors and relationship quality. **RESULTS/FINDINGS:** Results indicated a greater degree of religious coping and internal coping were each significantly associated with more hope, whereas support seeking was not related with more hope. Higher hope was significantly associated with greater relationship quality. An indirect effect from both religious coping and internal coping to hope, and then hope to relationship quality was identified. **CONCLUSION:** Results imply the importance of both religious and internal coping strategies as well as the vital role of hope in higher relationship quality of mothers. Implications for professionals may include fostering not only coping strategies but also hope to improve intimate partnership in parents of children with Down syndrome. Future research endeavors may wish to explore whether this effect is present in more racially diverse populations as well as how coping behaviors and hope may affect relationship quality in fathers.

~WITHDREW~

PUBLIC ATTITUDES AND PERCEPTIONS OF WIND ENERGY DEVELOPMENT WITHIN THE ROLLING PLAINS AND BREAKS ECOLOGICAL REGION

Terry Tucker

Department of Landscape Architecture/Regional and Community Planning, College of Architecture, Planning, and Design

BACKGROUND AND PURPOSE: Within the Great Plains region, lack of regulation of wind energy development is of great importance. The selection of regulatory boundaries will greatly impact the public's perception of the industry and its future development in this region. Currently, regulation is left largely to state and county governments. A majority of these entities in the Great Plains region have no regulations governing wind energy development or employ a patchwork of "borrowed" codes from across the nation. This system of regulation fails to recognize the high degree of correlation between social, economic, and natural resources irrespective of political boundaries. **METHOD:** A survey of three counties within a level IV ecoregion was conducted for a period of one month. These counties had varying levels of interaction with wind energy development. The data was analyzed for correlations and statistical significance between the attitudes and opinions of the residents. **RESULTS/FINDINGS:** It is expected that statistical analysis will show high correlations and statistical significance between the attitudes and perceptions of residents within the Level IV ecoregion, which supports this as a viable boundary for wind energy regulation. **CONCLUSION:** The use of political boundaries to regulate natural resources has proven as ill-equipped to address the expectations, fears, and concerns of the public when dealing with natural resource development. By basing regulatory boundaries upon ecological regions, developers and governmental and energy entities have the potential to address these community issues and respond sensitively to the ecology of the region.

DOES ALLOCATION OF TIME REALLY MATTER FOR THE WOMEN'S EMPOWERMENT? AN EVALUATION OF WOMEN'S EMPOWERMENT INDEX IN AGRICULTURE WEAI

Sandra Contreras and Yacob Zereyesus

Department of Agricultural Economics, College of Agriculture

BACKGROUND AND PURPOSE: For the past three years, the Feed the Future Initiative has invested many resources in the creation and implementation of the Women's Empowerment in Agricultural Index (WEAI), in hopes to have an economic effective policy tool. This index is claimed to be a holistic tool to measure Women's Empowerment in the developing countries using a multidimensional approach, where the measurement of *time allocation* is the innovative component of the index. Although the WEAI has been used in many developing countries to create policies to transform the agricultural sector to an inclusive and equitable one, there have been few attempts to formally evaluate the performance of the index using an economic approach. **METHODS:** This paper evaluates the index (WEAI) that was calculated in Northern Ghana and Bangladesh by using a Multiple Indicators Multiple Causes (MIMIC). **RESULTS/FINDINGS:** After estimating three different specification using the MIMIC approach, the findings provided insight on how the calculation of the "time dimension" propose by WEAI miscalculate the level of Women's Empowerment in the Agricultural Index. Also, there is statistically evidence that eight of the ten indicators utilized in the WEAI explain the latent variable Women's Empowerment. Consumption as a proxy of income does not have an effect on women's empowerment in our model. **CONCLUSION:** WEAI is a holistic tool to measure women empowerment in agriculture, but revision to the time allocation calculation should be done in order to obtain more accurate measurements that are highly needed to improve the condition of women in this sector around the world.

HOSTILITY, ATTACHMENT, AND FORGIVENESS: A PATHWAY TO STRENGTH IN RELATIONSHIPS

Austin Beck, Jared Durtschi, Lauren Oseland, and Cameron Brown

School of Family Studies and Human Services, College of Human Ecology

BACKGROUND AND PURPOSE: Forgiveness is an essential part of relationships that thrive. Forgiveness tends to become increasingly difficult as the intensity and duration of hostility rises. Understanding conditions that help forgiveness be possible, as well as those that actually make forgiveness more difficult, then becomes important if therapists are going to help relationships last. **METHOD:** Using self-report data from the college aged participants ($n = 257$ emerging adults) across multiple waves, we measured the association between hostility and forgiveness to test the moderating role attachment may play in forgiveness. **RESULTS/FINDINGS:** Results indicate anxious attachment moderates the association between hostile interactions and resentment, or the inability to forgive. **CONCLUSION:** Findings suggest a reduction in anxious attachment could help facilitate a reduction in resentment, thus bringing couples closer to forgiveness and healing.

AN EXPLORATION OF PTSD AS A MEDIATOR BETWEEN TRAUMA EXPOSURE AND ATTACHMENT BEHAVIORS IN MARRIED ADULTS

Lauren M. Oseland,¹ Kami L. Gallus,² Austin R. Beck¹, and Briana S. Nelson Goff¹

¹School of Family Studies & Human Services, College of Human Ecology; ²Human Development & Family Science, Oklahoma State University

BACKGROUND: There is a significant body of research that describes the negative impact of traumatic stress on marital relationships. However, there are few empirical studies that examine the pathways trauma takes to harm these important interpersonal bonds. **METHOD:** Using a sample of 116 married adults, this study examined whether the effects of trauma exposure were associated with connecting behaviors (i.e., accessibility, responsiveness, engagement) found to promote secure attachment bonds and if this association was mediated by any of the four PTSD symptom clusters (i.e., intrusion, avoidance, negative alterations in cognition, and arousal). Ten actor mediation models were run to assess symptom cluster mediation of trauma exposure and connecting behaviors. **RESULTS:** Results revealed that Total PTSD scores, as well as the avoidance, negative alterations in cognition, and arousal symptom clusters mediated the relationship between trauma exposure and connecting behaviors in males. No association was found for females. **CONCLUSION:** Findings may shed light on one mechanism by which trauma specifically effects the relationship between survivors and their partners. rsue your research goals. **RESULTS/FINDINGS:** Summarize the anticipated or actual results or findings from your work. **CONCLUSION:** Discuss the implications or applications your results have for theory, future research, and/or real world experiences, problems, etc.

Interdisciplinary

BIODEGRADABLE STARCH/PVOH/LAPONITE RD BASED BIONANOCOMPOSITE FILMS FOR FOOD PACKAGING APPLICATIONS: PREPARATION, CHARACTERIZATION AND REINFORCEMENT WITH GRAPHENE OXIDE

Pavan Harshit Manepalli¹, Chetan Sharma¹, Aditya Thatte², Sabu Thomas³, Nandakumar Kalarikkal³, and Sajid Alavi¹

¹Department of Grain Science and Industry, College of Agriculture; ²Department of Agricultural and Food Engineering, Indian Institute of Technology, Kharagpur, India; ³Centre for Nanoscience and Nanotechnology, Mahatma Gandhi University, Kottayam, India

BACKGROUND AND PURPOSE: Starch and poly(vinyl alcohol) (PVOH) based packaging is of great importance and has additional benefits over petroleum based packaging due to their abundant availability, biodegradability and compatibility. The aim of this research is to propose advances for the preparation of hybrid bionanocomposites prepared by the combination of intercalation from solution and melt mix methods. The effect of the Laponite RD (LRD) content on the mechanical and barrier properties of starch/PVOH based films were evaluated. **METHOD:** Starch and PVOH (1:1 to 4:1) were blended with LRD (0-20% polymer basis) to form a bionanocomposites using solution and melt mixing method and films of thickness ranging between 200 to 400 microns were formed using compression molding technique. Furthermore, the graphene oxide coating was used to further improve the water barrier property of these nanocomposites. **RESULTS AND CONCLUSION:** Presence of LRD improved the mechanical barrier properties of starch/PVOH matrix up to 10% level of LRD because of better surface interface interaction between polymer matrix and layers of LRD. Water absorption studies showed higher water absorption for solution mix compared to melt mix indicating higher degree of exfoliation occurred with melt mixing method. LRD levels and graphene oxide have significant effects on barrier properties of bionanocomposites film at $P < 0.01$ and $P < 0.05$ respectively. Water absorption was found minimum with a coat having 10 % LRD and 25:75 graphene:lipid proportion. Thus, these results indicate that the exfoliated starch/PVOH/LRD nanocomposites have great potential for industrial applications and more specifically in the packaging field.

APPLICATION OF CELLULOS AND LIGNIN-COATED CELLULOSE BASED NANOFILLERS FOR BIO-BASED PACKAGING

Jingwen Xu, Pavan Harshit Manepali, Lijia Zhu, and Sajid Alavi
Department of Grain Science and Industry, College of Agriculture

BACKGROUND AND PURPOSE: Bio-based polymers are of great interest to industry because of environmental concern with environmental plastics. The objective of this study was to enhance the barrier and mechanical properties of films made from Poly (lactic acid) (PLA) and Poly (butylene succinate) (PBS) by adding nano-fillers such as nanocrystalline cellulose (NCC) and lignin-coated nanocrystalline cellulose (LNCC). **METHOD:** 3% wt NCC and LNCC was melt blended into PLA and PBS before being hot pressed into 0.075 mm films. **RESULTS AND DISCUSSION:** Transmission electron microscope (TEM) and X-ray diffraction (XRD) image indicated nano-fillers were dispersed uniformly in polymer matrix. Change in heat capacity (ΔC_p) decreased from 0.5 J/g°C to 0.4 J/g°C and 0.43 J/g°C with addition of NCC and LNCC to PLA respectively at glass transition, indicating greater confinement. ΔC_p of PBS based nanocomposites, decreased with addition of NCC (0.14 to 0.11 J/g°C) but increased with addition of LNCC (0.14 to 0.18 J/g°C). ΔH_c increased with NCC addition (65.94 to 67.09 J/g) and decreased with LNCC addition (65.94 to 63.63 J/g) indicating that crystallinity increased with addition of NCC only. Tensile testing data indicated increase in tensile strength from 47.80 MPa to 52.75 MPa and 54.77 MPa with addition of NCC and LNCC to PLA respectively. Similarly in PBS based nanocomposites, tensile strength increased from 27.11 MPa to 30.85 MPa and 29.87 MPa with addition of NCC and LNCC respectively. Oxygen transmission rates (OTR) and Water vapor transmission rate (WVTR) of PLA and PBS based nanocomposites decreased with the addition of NCC and LNCC.

OPTIMUM AMOUNT OF *RHUS GLABRA L.* AS A NATURAL MORDANT

Sarif Patwary and Sherry Haar

Department of Apparel, Textiles and Interior Design, College of Human Ecology

BACKGROUND: *Rhus Glabra L.* is one of US native species among sumacs. Native american used *Rhus Glabra L.* (Sumac) for medicine, food, tobacco, tannin, dye etc. Due to unsustainable practices in the textile dyeing industry, there has been a renewed interest in natural dyes, including plant mordants. Plants, rich in tannin content, are potential sources of natural mordants, such as- myrobalan, chestnut, sumac, symplocose etc. Research shows that such mordants yield increased colorfastness in combination with aluminium while providing economic resources for the plant producers. **OBJECTIVES:** In this research, tannin from sumac leaves is extracted and applied as a natural mordant alone and in combination with alum acetate for dyeing on cotton fabric by natural dyes. Color fastness properties to laundering, light and perspiration are investigated in accordance to AATCC test methods to find optimum amount. **METHODOLOGY:** The tests are carried out for two sets of samples- in one set premordanted cotton fabric with 50%, 100%, 150% and 200% OWF ground leaves of sumac are dyed with 5% weld and in another set an additional treatment with alum acetate are carried out before applying weld. Resulting colors were rated using CIE L*a*b values. GLM Anovas and two sample t-tests are used to analyze CIE L*a*b values statistically. **ANTICIPATED RESULTS/FINDINGS:** The test data of two sets of samples will be examined and the optimum amount among the combinations would be recommended. **CONCLUSION:** This finding will help natural dye artisan with additional natural mordant options to chose from as well as bring potential economic sources for local sumac plant producers.

NOVEL APPLICATION OF AUTOLYTIC ENZYME: IMPLICATION ON PRETREATMENT STRATEGIES OF BIOPRODUCT EXTRACTION FROM MICROALGAE

Laura Soto Sierra, Chelsea Dixon, and Lisa R. Wilken

Department of Biological and Agricultural Engineering, College of Engineering

BACKGROUND AND PURPOSE: To combat the limitations of commercializing microalgal-derived biofuels, alternative oil extraction procedures must be employed. The use of enzymes for cell wall and organelle disruption and lysis are advantageous over traditional extraction techniques such as the energy-intensive process of drying and pressing. The use of autolytic, species-specific enzymes provides an opportunity for establishing a pretreatment method as part of an integrated aqueous enzymatic extraction of oil from microalgae. **METHOD:** A study was conducted to evaluate the effect of autolysin, an autolytic metalloproteinase, on *Chlamydomonas reinhardtii* cell lysis and enhanced oil extraction in comparison to traditional disruption techniques. Increased temperature and controlled mixing were utilized as augmenting factors to improve the pretreatment of microalgae cells. The extent of cell lysis was measured by direct cell count and visualized using electron microscopy. Furthermore, recoverable lipids before and after autolysin treatment were determined by subsequent solvent extraction. **RESULTS/FINDINGS:** Autolysin treatment at room temperature and constant mixing was capable of lysing over 50% of cells which could be increased to over 80% by increasing the incubation temperature. Pretreatment with autolysin significantly increased lipid yield as quantified by solvent extraction. **CONCLUSION:** Results indicate that autolysin combined with controlled mixing and incubation temperatures can enhance cell lysis and facilitate improved oil extraction with subsequent secondary treatments. The pretreatment established represents a novel application of autolysin in catalyzing whole cell lysis beyond previous uses solely in cell transformation.

MORPHOLOGY-DRIVEN REPELLENT NANOWEBS

Yue Yuan¹, Jooyoun Kim¹, and Seong-O Choi²

¹*Department of Apparel, Textiles and Interior Design, College of Human Ecology;* ²*Department of Anatomy and Physiology, College of Veterinary and Medicine*

BACKGROUND AND LIMITATIONS: Super-repellent surface design has drawn emerging attention in recent decades due to its applicability to protective and self-cleaning products. It is generally accepted that creating nanoscale roughness on a hydrophobic material is an efficient way of fabricating a repellent surface. Electrospinning can be employed to fabricate nanoscale fiber webs with varied topological structures. Although polystyrene (PS) electrospun webs with the varied morphology have been previously produced by electrospinning, little is investigated regarding the relationship between repellency and morphological structure. **PURPOSE/METHOD:** This study investigates the influence of morphological parameters on the surface repellency (or wettability). PS that has a low surface energy (~33 mN/m) is electrospun to introduce the varied roughness structures by adjusting the parameters. The repellency of electrospun webs, measured by the static contact angle of water, is compared to that of a smooth PS film to analyze the contribution of roughness to repellency. The surface structure of the electrospun web is characterized via scanning electron microscopy (SEM). **RESULTS/FINDINGS:** Varied roughnesses in nanowebs such as beads, wrinkles, and smooth fibers were formed by electrospinning. Compared to the smooth PS film, the water contact angle of the PS electrospun web was apparently increased. Also, the PS webs with different fiber morphologies gave the different level of repellency. **CONCLUSION/SIGNIFICANCE:** Various surface roughnesses improved water repellency influenced the degree of water-repellency. It is recommended to extend the repellency tests against the lower surface tension liquids for investigating the super-repellent capability in various conditions.

OPTIMIZATION OF LIGNOCELLULOSIC BIOMASS-TO-BIOFUEL SUPPLY CHAINS WITH DENSIFICATION: A REVIEW

Nibal Albashabsheh and Jessica L. Heier Stamm

Department of Industrial & Manufacturing Systems Engineering, College of Engineering

BACKGROUND AND PURPOSE: Biofuels are environmentally friendly renewable energy sources with the potential to reduce dependency on fossil fuels. To realize this potential, much research has been directed to better understand and manage the logistics challenges arising in the biomass-to-biofuel supply chain (BBSC). Among these challenges, the low bulk density of biomass is the most pressing because it increases costs associated with biomass transportation, storage, and handling. Densification techniques, such as baling, pelleting, and pyrolysis, help mitigate these costs, but the role of densification within the overall supply chain context is not yet well understood. **METHOD:** This poster describes a literature review of modeling and optimization studies of lignocellulosic biomass supply chains with densification processes. Research studies in academic journals, books, and trade publications were classified based on three criteria: densification method, analytical methodology, and feedstock type. **FINDINGS:** Published studies use four main approaches to analyze BBSCs with densification: geographical information systems models, cost analyses, mixed integer programming models, and simulation. Baling is the most-studied densification technique, while cost analysis is the most common analysis method. Although pelleting and pyrolysis achieve higher density than baling, comparatively few studies have examined their role in the overall supply chain. **CONCLUSION:** We conclude with a summary of future research opportunities, the most significant of which are integrating mobile densification and introducing comprehensive BBSC optimization models.

DESIGN OF A HANDHELD PHENOTYPING PLATFORM

Yong Wei¹ and Jared Crain²

¹*Department of Biological and Agricultural Engineering, College of Engineering;* ²*Department of Plant Pathology, College of Agriculture*

BACKGROUND AND PURPOSE: Accurate and efficient phenotyping has become the biggest hurdle for evaluating large populations in plant breeding and genetics. Contrary to genotyping, high-throughput approaches to field-based phenotyping have not been realized and fully implemented. To address this bottleneck a novel low-cost, flexible, handheld phenotyping platform was developed and tested on a field trial of 10 historical and current elite wheat (*Triticum aestivum*) breeding lines at the International Maize and Wheat Improvement Center (CIMMYT). **METHOD:** The lines were planted during the 2013 and 2014 growing cycle at Ciudad Obregon, Mexico, and evaluated multiple times throughout the growing season. The phenotyping platform was developed by integrating several sensors: GreenSeeker, an infrared thermometer (IRT), and a global positioning system (GPS) receiver into one functional unit. It enabled simultaneous collection of normalized difference vegetative index (NDVI) and canopy temperature (CT) with precise assignment of all measurements to plot location by GPS data points. **RESULTS:** The temperature measurements were highly correlated to a handheld IRT. CT and NDVI were both significantly correlated to yield throughout the growing season. **CONCLUSION:** The handheld phenotyping platform is a flexible, low-cost and easily deployable option to increase the amount of phenotypic data that crop breeders obtain, as well as provide dense phenotypic data for genetic discovery.

OPTIMIZE ULTRASONIC PRETREATMENT TO ENHANCE GLUCOSE YIELDS OF BIG BLUESTEM USING RESPONSE SURFACE METHODOLOGY

Youjie Xu and Donghai Wang

Department of Biological and Agricultural Engineering, College of Engineering

BACKGROUND AND PURPOSE: Cellulosic biomass is considered as a desirable alternative feedstock for biofuel production because it is largely available and has no competition with food crops. Big bluestem (*Andropogon gerardii*) is a dominant warm-season (C4) perennial native grass that comprises as much as 80% of the plant biomass in prairies in the midwestern grasslands of North America. This study focuses on the ultrasonic pretreatment of big bluestem following enzymatic hydrolysis to increase glucose yield. **METHOD:** The pretreatment conditions including reaction temperature, retention time and ultrasonic power on glucose yield were optimized using response surface methodology. Glucose content was measured by High Performance Liquid Chromatography (HPLC). **RESULTS AND CONCLUSION:** Compared with other thermochemical conversion technologies, such as acid and alkaline pretreatments, the advantage of using ultrasonic pretreatment is that no chemical reagents are needed during treatment and the treatment is under mild conditions. The maximum glucose yield of 90.06% was obtained at retention time of 61.5 min, reaction temperature of 195°C, and ultrasonic power percent of 15 %.

RAPID EVOLUTION IN A DISTURBED ENVIRONMENT: EVOLUTIONARY RESPONSE OF WIDESPREAD GRASS *ANDROPOGON VIRGINICUS* TO HEAVY METALS IN AN ABANDONED MINE SITE

Samantha Sharpe and Loretta Johnson

Department of Biology, College of Arts and Sciences

BACKGROUND AND PURPOSE Anthropogenic activities have severely altered the earth's ecosystems, driving many species to undergo rapid evolution in response to extreme and changing conditions. In this work, I aim to investigate genotypic and phenotypic components of adaptive variation in heavy metal exposed populations of *Andropogon virginicus*, a common perennial grass that often grows in contaminated mine soil. **METHOD** Using a reciprocal transplant, I will compare populations of *A. virginicus* collected from the Tar Creek EPA Superfund site, a 100-square-mile abandoned lead and zinc mine, with those collected from nearby old-field sites to determine if ecotypic adaptation to contaminated soils has occurred in Tar Creek populations. I will measure adaptation through phenotypic traits including survival, vegetative morphology (height, biomass, leaf width), fitness (seed production), and physiology (photosynthesis, tissue levels of lead and zinc, relevant metabolites). Genotype and gene expression will be compared between populations using GBS, whole genome re-sequencing, and RNA-seq. **RESULTS/FINDINGS** Preliminary analysis of soils from seven mine areas and five old-field sites at 40 km distance has revealed substantially elevated levels of lead (30x), zinc (10x), and cadmium (50x) in the mine sites compared to off-mine sites. A century of mining and likely selection in highly metallic soils will be putatively sufficient to produce divergent local adaptation in mine populations, as measured by altered genotypes and superior performance in contaminated soils. **CONCLUSIONS** A better understanding of *A. virginicus* adaptation to contaminated environments can help inform the EPA's efforts to reduce erosion, decontaminate soils, and restore areas such as the Tar Creek Superfund site.

AN AGENT-BASED MODELING APPROACH TO IMPROVE COORDINATION BETWEEN HUMANITARIAN RELIEF PROVIDERS

Megan Menth and Jessica L. Heier Stamm

Department of Industrial and Manufacturing Systems Engineering, College of Engineering

BACKGROUND & PURPOSE: Logistical coordination between humanitarian organizations is crucial during the response effort to a disaster, as coordinating aid improves efficiency, reduces duplication of effort, and ultimately leads to better outcomes for beneficiaries. One challenge in particular is making facility location decisions, where make-shift homes, medical tents, or other aid-related facilities need to be placed in a way that provides fair service to all in need. The main objective of this research is to increase understanding of effective coordination strategies for solving this facility location problem. **METHODS:** This research aims to improve upon the current practices of facility placement coordination by drawing on data from the 2015 earthquake in Nepal. We use data from this event, along with data taken from a survey of active humanitarians, to develop an agent-based simulation model. This model tests different decision rules and coordination strategies between the many humanitarian organizations, or agents, involved in the response effort as they decide the placement of both formal and informal temporary education facilities. Effectiveness of the different coordination strategies will be evaluated by how many beneficiaries are reached, along with the how quickly they are reached. **RESULTS & CONCLUSIONS:** The agent-based models we develop in this case study are expected to produce generalizable insights to improve coordination in facility placement for future disasters.

SIZE AND TIMING MATTER: DIFFERENTIAL TRIGLYCERIDE RESPONSES TO THREE MEAL CONDITIONS

Sam R. Emerson¹, Stephanie P. Kurti², Colby S. Teeman¹, Emily M. Emerson¹, Brooke J. Cull¹, Mark D. Haub¹, and Sara K. Rosenkranz¹

¹*Department of Human Nutrition, College of Human Ecology;* ²*Department of Kinesiology, College of Human Ecology*

BACKGROUND: A substantial rise in blood lipids, namely triglycerides, following a meal is associated with increased risk for cardiovascular disease, visceral adiposity, and insulin resistance. However, research investigating the effects of a meal on blood lipids has not utilized test meals that reflect typical consumption. The purpose of this study was to compare the triglyceride response of realistic meals containing moderate fat and energy content against a high-fat meal (HFM) typically used to test triglyceride responses. **METHODS:** Eight men (age: 25.8±6.9 years) completed three meal trials in randomized order: a HFM (17 kcal/kg, 60% fat, 23% CHO); a moderate-fat meal (MFM; 8.5 kcal/kg, 30% fat, 52% CHO); and a biphasic meal (BPM), in which participants consumed the MFM at baseline and again three hours later. Venous blood samples were collected via indwelling catheter at baseline and then hourly for six hours post-meal to assess the triglyceride response. **RESULTS:** Total area-under-the-curve (AUC) for triglycerides was significantly greater following the HFM (1409.3±815.0 mg/dL*6hrs) compared to the MFM (819.1±491.5 mg/dL*6hrs; $p=0.001$) and the BPM (1003.1±825.8 mg/dL*6hrs; $p=0.037$), although the MFM and BPM were not significantly different ($p=0.952$). Incremental AUC for triglycerides was also significantly greater following the HFM (679.5±414.9 mg/dL*6hrs) versus the MFM (213.5±201.7 mg/dL*6hrs; $p=0.004$) and the BPM (300.9±333.0 mg/dL*6hrs; $p=0.018$), with no difference ($p=0.999$) between the MFM and BPM. **CONCLUSIONS:** These findings suggest that the drastic postprandial triglyceride response following HFMs observed in previous studies may not be representative of the daily metabolic challenge of individuals eating relatively more moderate meals.

SENTIMENT ANALYSIS OF NEWS ARTICLES AND TWITTER DATA OF COMPANIES

Keerthi Korivi¹, William H. Hsu¹, Esther Swilley², and Ansley Chua³

¹*Department of Computing and Information Sciences, College of Engineering;* ²*Department of Marketing, College of Business Administration;* ³*Department of Finance, College of Business Administration*

BACKGROUND AND PURPOSE: Newspapers express opinions on the reputation, and the overall performance of several organizations including Fortune 500 companies. They indirectly inform about companies' performance in the stock market. Similarly, several blogs and the most popular microblogging site twitter informs about the people's opinion about these companies. Our goal is to identify the overall sentiment of these companies from newspaper articles as well as from Twitter. We also would like to know if newspaper articles impact is the result of twitter tweets or vice versa. **METHOD:** In this paper we compare the results from both the media i.e. newspaper articles and Twitter. This work addresses sentiment analysis, the task of identifying positive and negative opinions, emotions, and evaluations and subjectivity of the text. Sentiment analysis can be done at the document level, sentence level and phrase level. **RESULTS/FINDINGS:** We have prepared a newspaper articles data set of 7000 companies and about 2000 articles. Our Twitter data set has around 2000 tweets. **CONCLUSION:** In this work we have tried to implement document-level sentiment analysis using Naïve Bayes classification.

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