

# KANSAS ACADEMY OF SCIENCE



## 149<sup>th</sup> ANNUAL MEETING Program

7-8 APRIL 2017

FORT HAYS STATE UNIVERSITY

### MEETING AT A GLANCE

#### Friday 7 April ~ Sternberg Museum of Natural History

- 6:30 KAS Banquet
- 7:30 Keynote Address  
Dr. Courtney Quinn  
*Sustainability Science: An Interdisciplinary  
Pathway for Progress and Scholarship*
- 8:30 KAS Officers Meeting

#### Saturday 8 April ~ FHSU - Tomanek Hall

*Paper Sessions:* 8:00am-3:00pm - pp 3-6  
TM 108 - Palenontology Symposium  
TM 112 - Archeo-Anthro/Geography/  
Geology/Cell Bio-Genetics  
TM106 - Ecology/Organismal Biology  
TM 124 - Tardigrades/Biochem-Chem

*Poster Session:* 8:00am-3:00pm - pp 6-8  
Tomanek Hall Lobby  
Presenters on hand 1:00-1:30pm

*Lunch:* Gross Memorial Coliseum  
11:50am-1:00pm

*Awards*  
3:10 pm - Tomanek 106

*Abstracts:* pp 9-26

**FRIDAY 7 APRIL 2017**

**6:30pm Banquet ~**  
*Sternberg Museum of Natural History*

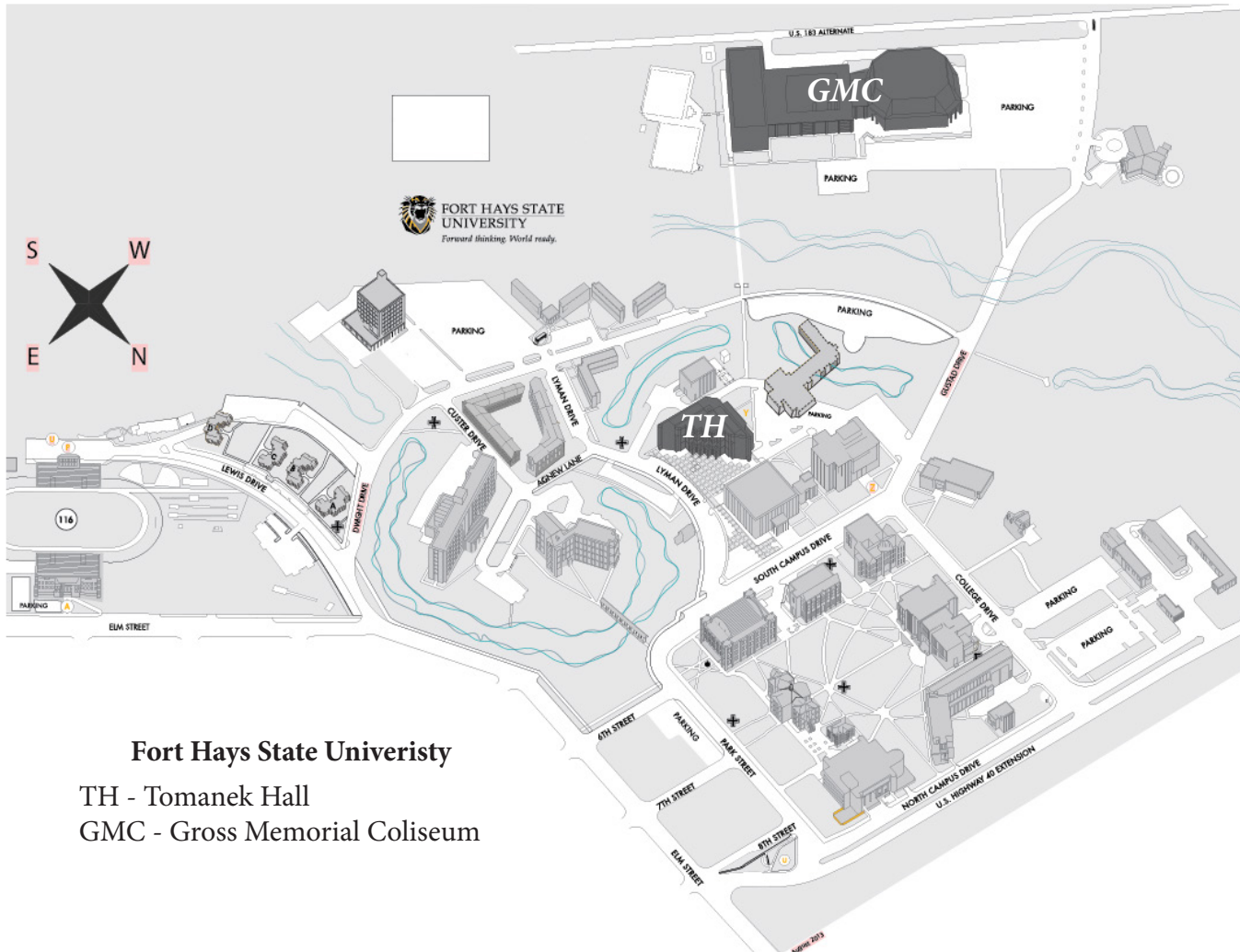
**7:30pm Keynote Address ~**  
*Sustainability Science: An Interdisciplinary Pathway for Progress and Scholarship*



**Dr. Courtney E. Quinn**  
Furman University, Greenville, South Carolina

Courtney E. Quinn, Ph.D., teaches in Sustainability Science at Furman University in Greenville, South Carolina. Dr. Quinn's courses examine socio-ecological interactions in the context of the United Nations 2030 Sustainable Development Goals. Courtney is also a lecturer for University of Nebraska-Lincoln in the Department of Agriculture Leadership, Education, and Communication teaching Environmental Leadership. Dr. Quinn's research interests include environmental and sustainability leadership and she conducts research on the human components of sustainable agricultural systems. Her current projects include 1) a USDA funded project on the social networks of niche pork producers of the southeast and 2) aligning consumer and farmer preferences for alternative food system opportunities. Courtney enjoys mentoring students in their individual passion within sustainability; from the role of empathy in support of sustainable policies, to slow-fashion, to stakeholder conceptualizations of environmental justice. Courtney received a bachelor's degree in Environmental Policy from Drake University, a Masters in the Human Dimensions of Natural Resources from the University of Nebraska-Lincoln, and a doctorate in Leadership Studies from the University of Nebraska-Lincoln. Courtney can be contacted at [courtney.quinn@furman.edu](mailto:courtney.quinn@furman.edu).

**8:30pm KAS Officer Meeting**



**Fort Hays State Univeristy**

TH - Tomanek Hall

GMC - Gross Memorial Coliseum

## SATURDAY 8 APRIL 2017

Oral presentation room/time assignments: Presenting author in ALL CAPS

### Tomanek Hall Room 108 — Paleontology Symposium

Moderator: *Mike Everhart*

- 8:10 **THE NEW AGE OF AN OLD COLLECTION: BRINGING THE FOSSILS OF THE STERNBERG MUSEUM INTO THE DIGITAL REALM**  
*BYRD, C.J.* (Sternberg Museum of Natural History [cjbyrd2@fhsu.edu]), *L.E. Wilson* (Sternberg Museum of Natural History [lewilson6@fhsu.edu]), *D.D. Jorgensen* (Department of Geosciences, Fort Hays State University [ddjorgensen@mail.fhsu.edu]), *J.L. King* (Department of Geosciences, Fort Hays State University [jking9@email.fhsu.edu])
- 8:30 **THE ROLE OF SEABIRDS IN UNDERSTANDING LATE CRETACEOUS MARINE ECOSYSTEMS**  
*WILSON, LAURA* (Sternberg Museum, Department of Geosciences, Fort Hays State University [lewilson6@fhsu.edu])
- 8:50 **BIG FISH, LITTLE FISH: WHERE ARE THE YOUNG AND JUVENILE *XIPHACTINUS AUDAX* FOSSILS?**  
*EVERHART, MICHAEL* (Sternberg Museum of Natural History [mike@oceansofkansas.com])
- 9:10 ***HESLERODUS DIVERGENS* (CHONDRICHTHYES: ELASMOBRANCHII) REMAINS FROM THE FARLEY LIMESTONE MEMBER OF THE LANE FORMATION (UPPER PENNSYLVANIAN, KASIMOVIAN) OF MISSOURI**  
*HOFFMAN, BRIAN* (Department of Natural and Physical Sciences, Park University [brian.hoffman@park.edu]), *Scott Hageman* (Department of Natural and Physical Sciences, Park University [shageman@park.edu])
- 9:30 **DENTAL STRUCTURE OF THE LATE CRETACEOUS (MAASTRICHTIAN) GUITARFISH *MYLEDAPHUS PUSTULOSUS***  
*HOFFMAN, BRIAN* (Department of Natural and Physical Sciences, Park University [brian.hoffman@park.edu]), *Jeffrey Jensen* (Department of Natural and Physical Sciences, Park University [jeffrey.jensen@park.edu]), *Scott Hageman* (Department of Natural and Physical Sciences, Park University [shageman@park.edu])

#### 9:50—BREAK

Moderator: *Laura Wilson*

- 10:10 **THE FIRST RECORD OF AN ASSOCIATED TOOTH SET OF *PTYCHODUS ANONYMUS* (ELASMOBRANCHII: PTYCHODONTIDAE) IN NORTH AMERICA FROM THE JETMORE FORMATION IN KANSAS**  
*HAMM, SHAWN* ([shamm821@gmail.com])
- 10:30 **ECOLOGICAL VARIABLES AND BODY SIZE IN A 2.5-MILLION-YEAR RECORD OF WHITE-TAILED DEER**  
*WILLIAMS, DANIEL* (Department of Biology, University of Saint Mary [williams255@stmary.edu])
- 10:50 **NEW INFORMATION ABOUT THE LOCATION AND SKELETAL STRUCTURE OF THE *TYRANNOSAURUS REX* SPECIMEN AT THE MUSEUM OF WORLD TREASURES**  
*KING, STEVEN* (Museum of World Treasures [sking@worldtreasures.org])
- 11:10 **PRELIMINARY APPROACH TOWARD DETERMINING A TROPHIC LEVEL ORGANIZATION WITHIN ACTINOPTERYGIAN CLADES FROM THE WESTERN INTERIOR SEAWAY**  
*MICHELS, AMBER* (Department of Geosciences, Fort Hays State University [a\_michels@mail.fhsu.edu])
- 11:30 **COMPARISONS OF FOSSIL BIOTAS OF THE LATE CARBONIFEROUS GARNETT AND HAMILTON QUARRY LOCALITIES, EASTERN KANSAS**  
*WEHRBEIN, RANDOL* (Earth Science Department, Emporia State University [rlwehrbein@gmail.com])

#### 11:50—LUNCH

Moderator: *Randol Wehrbein*

- 1:30 **PRELIMINARY RESULTS OF LONG BONE HISTOLOGY IN AN ONTOGENETIC SERIES OF *CLIDASTES* (SQUAMATA: MOSASAURINAE)**  
*GREEN, CYRUS* (Department of Geosciences, Fort Hays State University [ccgreen@mail.fhsu.edu]), *Laura Wilson* (Department of Geosciences, Fort Hays State University [lewilson6@fhsu.edu])
- 1:50 **WHAT DOES THE CO-OSSIFICATION OF THE VERTEBRAL AND PECTORAL GIRDLE ELEMENTS TELL ABOUT THE SKELETAL MATURITY OF *DOLICHORHYNCHOPS*?**  
*HOLMAN, PIKE* (Department of Geoscience, Fort Hays State University [plholman@mail.fhsu.edu])
- 2:10 **THE RELATIONSHIP AMONG SUTURE COMPLEXITY, SHELL FORM, AND FORMATION IN AMMONITES OF THE WESTERN INTERIOR SEAWAY**  
*JORGENSEN, DARRAH* (Department of Geosciences, Fort Hays State University [ddjorgensen@mail.fhsu.edu])

## Tomanek Hall Room 106 – Ecology/Organismal Biology

Moderator: *Travis W. Taggart*

- 8:10 **HOST RANGE OF AN ENDOGENOUS STRAIN OF *DAHLIA* MOSAIC VIRUS IN MEMBERS OF ASTERACEAE**  
*CAUDLE, KERI* (Department of Biological Sciences, Fort Hays State University [klcaudle@mail.fhsu.edu]), *Eric Gillock* (Department of Biological Sciences, Fort Hays State University [egillock@fhsu.edu])
- 8:30 **CRITICAL HABITAT ASSESSMENT OF THE STATE THREATENED BROAD-HEADED SKINK**  
*HULLINGER, ALLISON* (Department of Biological Sciences, Fort Hays State University [arhullinger@mail.fhsu.edu]), *Zackary Cordes* (Ecological Services Section, Kansas Department of Wildlife, Parks, and Tourism [zackary.cordes@ks.gov]), *Daren Riedle* (Ecological Services Section, Kansas Department of Wildlife, Parks, and Tourism [daren.riedle@ks.gov]), *William Stark* (Department of Biological Sciences, Fort Hays State University [wstark@fhsu.edu])
- 8:50 **TRACKING WESTERN MASSASAUGA IN A LARGE INTERIOR WETLAND**  
*MEAD, JOSHUA* (Department of Biological Sciences, Fort Hays State University [jjmead@mail.fhsu.edu]), *William Stark* (Department of Biological Sciences, Fort Hays State University [wstark@fhsu.edu])
- 9:10 **POSSIBLE RELATIONSHIP BETWEEN VOCAL COMMUNICATION SYSTEM AND FAT RESERVE IN WINTERING BIRDS: A TEST OF THE OPTIMAL BODY MASS THEORY**  
*PERERA, NUWANTHIKA* (Department of Biological Sciences [dxgamage@shockers.wichita.edu])
- 9:30 **DEER EFFECTS ON CROSS TIMBERS OAK WOODLAND REGENERATION IN LARGE VS. SMALL CANOPY GAPS**  
*CORY, BEVERLY* (Department of Biology, Wichita State University [bjcory@shockers.wichita.edu])

### 9:50—BREAK

Moderator: *Mark LaBarge*

- 10:30 **VARIATION IN THE FLIGHT MORPHOLOGY OF THE CLIFF SWALLOW**  
*STEFFEN, DYLAN* (Department of Biological Sciences, Fort Hays State University [djsteffen2@mail.fhsu.edu]), *Jeffrey Carter* (Department of Biological Sciences, Fort Hays State University [jjcarter2@fhsu.edu])
- 10:50 **GENETIC AND ENVIRONMENTAL INFLUENCES ON STOMATES OF BIG BLUESTEM (*ANDROPOGON GERARDII*) ECOTYPES**  
*VARVEL, NICK* (Fort Hays State University, Department of Biological Sciences, 600 Park St., Hays, Kansas, 67601, USA [navarvel@mail.fhsu.edu]), *Christina Hilt* (Fort Hays State University, Department of Biological Sciences, 600 Park St., Hays, Kansas, 67601, United States [cjhilt@mail.fhsu.edu]), *Sara Baer* (Southern Illinois University, Department of Plant Biology and Center for Ecology, Carbondale, IL, 62901, USA [sgbaer@siu.edu]), *Loretta Johnson* (Kansas State University, Biology, Ackert Hall Rm 232, Manhattan, KS, 66506-4901, USA [johnson@ksu.edu]), *Brian Maricle* (Fort Hays State University, Department Of Biological Sciences, 600 Park St., Hays, KS, 67601-4099, USA [brmaricle@fhsu.edu])
- 11:10 **SMALL SCALE RESTORATION OF THE STERNBERG NATURAL AREA: POTENTIAL INFLUENCES ON THE SMALL MAMMAL COMMUNITY**  
*BOROUGHES, KALI* (Biological Sciences Department, Fort Hays State University [klboroughes@mail.fhsu.edu]), *Morgan Noland* (Biological Sciences Department, Fort Hays State University [manoland@fhsu.edu]), *Schmidt Curtis* (Biological Sciences Department, Fort Hays State University [cjschmidt@fhsu.edu]), *Mitchell Greer* (Biological Sciences Department, Fort Hays State University [mjgreer@fhsu.edu])
- 11:30 **THE CORRELATION BETWEEN AGE AND SEQUENTIAL ORDER OF *GIRAFFA RETICULATA***  
*SCHUCK, BRIANNA* (Department of Biology Fort Hays State University [blschuck@mail.fhsu.edu])

### 11:50—LUNCH

Moderator: *Christina Byrd*

- 1:30 **RESPONSES BY ATLANTIC GHOST CRAB (*OCYPODE QUADRATA*) POPULATIONS TO NATURAL AND ANTHROPOGENIC DISTURBANCES ON A TEXAS BEACH: A 10-YEAR STUDY**  
*MACCARONE, ALAN* (Field Biology Program, Friends University, 2100 University [alanm@friends.edu]), *Patrick Mathews* (Field Biology Program, Friends University, 2100 University [mathews@friends.edu])
- 1:50 **POPULATION DYNAMICS OF THE COMANCHE HARVESTER ANTS (*POGONOMYRMEX COMANCHE*) IN KANSAS**  
*MATHEWS, PATRICK* (Department of Biology, Friends University, Wichita [mathews@friends.edu])
- 2:10 **PATTERNS OF PREDATION ON BIVALVE MOLLUSKS ALONG THE TEXAS GULF COAST**  
*RANDOLPH, SERENA* (Field Biology Program, Friends University [serena\_randolph@student.friends.edu])
- 2:30 **VIGILANCE PATTERNS OF BLACK-TAILED PRAIRIE DOGS (*CYNOMYS LUDOVICIANUS*) IN URBAN AND RURAL COLONIES**  
*PITSCHMANN, JUSTIN* (Department of Biology, Sterling College [justinpitschmann@gmail.com]), *Jonathan Conard* (Department of Biology, Sterling College [jconard@sterling.edu])
- 2:50 **SEX-DEPENDENT DIFFERENTIAL INVESTMENTS INTO COSTLY LEG REGENERATION IN WOLF SPIDERS**  
*Sheryl Evans* (Department of Natural Sciences, McPherson College [evanshe@bulldog.mcpherson.edu]), *WILGERS, DUSTIN* (Department of Natural Sciences, McPherson College [wilgersd@mcpherson.edu])

## Tomanek Hall Room 112 — Archeo-Anthro/Geography/Geology/Cell Bio-Genetics

Moderator: *James King*

- 8:10 **ANALYSIS OF ROMAN COINS USING XRF TECHNIQUES**  
*BROOKS, AARON* (Department of Mathematics and Physics, Baker University [AaronSBrooks@stu.bakeru.edu]), *John Richards* (Department of History, Baker University [John.Richards@bakeru.edu]), *Mahmoud Al-Kofahi* (Department of Physics, Baker University [mal-kofahi@bakeru.edu])
- 8:30 **MAGNETOMETER SURVEY: AN ATTEMPT TO LOCATE SUSPECT, UNMARKED GRAVES AT THE B.O.D. LOOK-OUT STATION 1867 ATTACK SITE NEAR ANTONINO, KANSAS**  
*NEUHAUSER, KENNETH* (Department of Geosciences Fort Hays State University [kneuhaus@fhsu.edu]), *Kristopher Neuhauser* (Department of Geosciences Fort Hays State University [kjneuhauser@mail.fhsu.edu])
- 8:50 **MAGNETOMETER SURVEYS: ATTEMPTS AND ISSUES IN LOCATING A 1948 PRIVATE WATER WELL ON THE SHORE OF LAC SAULT DORE, PRICE COUNTY, WISCONSIN**  
*NEUHAUSER, KENNETH* (Department of Geosciences Fort Hays State University [kneuhaus@fhsu.edu]), *Kristopher Neuhauser* (Department of Geosciences Fort Hays State University [kjneuhauser@mail.fhsu.edu])
- 9:10 **EMERGENCY RESPONSE UAV MAPPING RESPONSE TIME**  
*HILLS, DALTON* (Department of GeoScience [D\_hills@mail.fhsu.edu])
- 9:30 **EMERGENCY RESPONSE UAV MAPPING RESPONSE TIME**  
*HILLS, DALTON* (Department of GeoScience [D\_hills@mail.fhsu.edu])

**9:50—BREAK**

Moderator: *James King*

- 10:10 **THE ORIGIN OF HIGH SILICA AND LOW PH IN THE GROUNDWATER OF THE KHORAT PLATEAU IN NORTH-EASTERN THAILAND**  
*SCHWINGHAMER, KATY* (Department of Physical Science, Emporia State University [kschwin1@g.emporia.edu]), *Marcia Schulmeister* (Department of Physical Science, Emporia State University [mschulme@emporia.edu])
- 10:30 **USING SOILS AND STRATIGRAPHY TO HELP ADDRESS IMPORTANT RIVER MANAGEMENT AND CULTURAL RESOURCE ISSUES IN KANSAS**  
*LAYZELL, TONY* (Kansas Geological Survey [alayzell@ku.edu])
- 10:50 **NEWLY RECOGNIZED FAULTS REVEALED IN HILLSHADED LIDAR IN EASTERN KANSAS**  
*PETERSON, ALAN* (Emporia State University [apeters3@g.emporia.edu])
- 11:10 **PRELIMINARY U-PB ZIRCON AGES OF THE ASHFALL FOSSIL BEDS IN NORTHEASTERN NEBRASKA: GEOCHRONOLOGY OF A KONSERVAT-LAGERSTÄTTEN IN THE NORTHERN HIGH PLAINS**  
*TURNER, ELIJAH* (Department of Geology, University of Kansas [eli\_turner@ymail.com]), *Jon Smith* (Kansas Geological Survey, University of Kansas [jjsmith@ku.edu]), *Andreas Möller* (Department of Geology, University of Kansas [amoller@ku.edu]), *Rick Otto* (University of Nebraska State Museum [rick.otto@unl.edu]), *Mathew Joeckel* (University of Nebraska-Lincoln [rjoeckel3@unl.edu]), *Shane Tucker* (University of Nebraska-Lincoln [stucker3@unl.edu])
- 11:30 **RECENT ADVANCES TOWARD DEVELOPING A U-PB ZIRCON CHRONOSTRATIGRAPHY OF CENOZOIC STRATA IN THE CENTRAL HIGH PLAINS AQUIFER OF KANSAS**  
*SMITH, JON* (Kansas Geological Survey, University of Kansas [jjsmith@ku.edu]), *Greg Ludvigson* (Kansas Geological Survey, University of Kansas [gludvigson@kgs.ku.edu]), *Anthony Layzell* (Kansas Geological Survey, University of Kansas [alayzell@ku.edu]), *Andreas Möller* (Department of Geology, University of Kansas [amoller@ku.edu]), *Elijah Turner* (Department of Geology, University of Kansas [eli\_turner@ymail.com]), *Jason Hallman* (Department of Geology, University of Kansas [j802h124@ku.edu]), *Brian Sitek* (Department of Geology, University of Kansas [bsitek@ku.edu])

**11:50—LUNCH**

Moderator: *Erin Morris*

- 1:30 **ANALYZING PROTEIN INTERACTIONS OF THE HERPES SIMPLEX VIRUS TYPE 1 UL34 PROTEIN**  
*HIGDON, NATHANIEL* (Department of Biology, Washburn University [nathaniel.higdon@washburn.edu])
- 1:50 **DIFFERENTIAL EXPRESSION OF ALDH1 AND NRF2 AT THE PROTEOMIC LEVEL IN SUBTYPES OF HUMAN OVARIAN CANCER CELL-LINES**  
*LIPILEKHA, MUKHERJEE* (Department of Biological Sciences, Wichita State Univ [lipilekha@gmail.com]), *Isabel Ruth Hendry* (Department of Biological Sciences, Wichita State Univ [izhendry@yahoo.com]), *Nayan Shrestha* (Department of Biological Sciences, Wichita State Univ [nayan.shrestha@wichita.edu])
- 2:10 **RAPID EVOLUTION IN A DISTURBED ENVIRONMENT: EVOLUTIONARY RESPONSE OF NATIVE GRASS *ANDROPOGON VIRGINICUS* TO HEAVY METALS IN AN ABANDONED MINE SITE**  
*SHARPE, SAMANTHA* (Division of Biology, KSU [sharpes@ksu.edu]), *Loretta Johnson*, (Division of Biology, KSU), *Nora Bello*, (Department of Statistics, KSU), *Olivia Parrish*, (Division of Biology, KSU), *Matthew Galliard*, (Division of Biology, KSU)

## Tomanek Hall Room 124 — Tardigrades/Biochem-Chem

Moderator: *Stephen Donnelly*

- 8:10 **TARDIGRADES OF THE CANOPY: ANOTHER NEW SPECIES OF THE GENUS *MILNESIUM* FROM KANSAS**  
*Sadie Schlabach* (Ithaca College, REU at Baker University [William.Miller@BakerU.edu]), *Emalee Donaldson* (Iowa State University, REU at Baker University [William.Miller@BakerU.edu]), *Jasmin Camba* (Hartnell College, REU at Baker University [William.Miller@BakerU.edu]), *MILLER, WILLIAM R.* (Biology, Baker University [William.Miller@BakerU.edu]), *Margret D. Lowman* (California Academy of Science [William.Miller@BakerU.edu])
- 8:30 **THE GREAT KANSAS WATER BEAR HUNT**  
*MILLER, WILLIAM R.* (Department of Biology and Chemistry, Baker University [William.Miller@BakerU.edu]) and *Jesi Rhodes* (Santa Fe High School)
- 8:50 **AN IDENTIFICATION KEY TO THE TARDIGRADES OF KANSAS**  
*TENNANT, MICHELLE R.* (Department of Mathematics and Physics), *Robert Schukei* (Department of Mathematics and Physics), *William R. Miller* (Department of Biology and Chemistry [William.Miller@BakerU.edu])
- 9:10 **THE EFFECT OF PH ON GOSSYPOL INHIBITION OF RABBIT MUSCLE LACTATE DEHYDROGENASE**  
*FINCH, NATHAN* (Department of Natural Sciences, McPherson College [nathanjfinch@gmail.com]), *Allan Ayella* (Department of Natural Sciences, McPherson College [ayellaa@mcpherson.edu])
- 9:30 **ANALYSIS OF MELAMINE IN PET FOODS USING GOLD NANOPARTICLES**  
*GOODROW, ELIZABETH* (Washburn University [elizabeth.goodrow@washburn.edu])

### POSTERS — Presenting author in ALL CAPS

Tomanek Hall Lobby (presenting authors available 1:00-1:30)

#### Cell Biology/Genetics

#### **THE LINK BETWEEN OBESITY AND THE EXPRESSION OF O-LINKED N-ACETYLGLUCOSAMINE TRANSFERASE IN *ICTALURUS PUNCTATUS***

*ABERNATHY, OAKLEE* (Department of Biological Sciences, Fort Hays State University [olabernathy@mail.fhsu.edu]), *Rebekah Spainhour* (Department of Biological Sciences, Fort Hays State University [r\_spainhour@mail.fhsu.edu]), *Yass Kobayashi* (Department of Biological Sciences, Fort Hays State University [y\_kobayashi@fhsu.edu])

#### **TREATMENT WITH STREPTOZOTOCIN (STZ) CAUSES HYPOGLYCEMIA AND ALTERS THE STABILITY OF REFERENCE GENES FOR REAL-TIME PCR ANALYSIS IN THE LIVER OF CHANNEL CATFISH**

*NEVAREZ, ERICKA* (Department of Biological Sciences, Fort Hays State University [e\_nevarez@mail.fhsu.edu]), *Norelia Ordonez* (Department of Biological Sciences, Fort Hays State University [nmordonezcastillo@mail.fhsu.edu]), *Rebekah Spainhour* (Department of Biological Sciences, Fort Hays State University [r\_spainhour@mail.fhsu.edu]), *Dr. Yasuhiro Kobayashi* (Department of Biological Sciences, Fort Hays State University [y\_kobayashi@fhsu.edu])

#### **USE OF MTOR AS A POTENTIAL MOLECULAR MARKER TO INVESTIGATE THE DEVELOPMENT OF OBESITY IN NON-MODEL FISH SPECIES**

*SPAINHOUR, REBEKAH* (Department of Biological Sciences - Fort Hays State University [r\_spainhour@mail.fhsu.edu]), *Jenna Ball* (Department of Biological Sciences - Fort Hays State University)

#### **EFFECTS OF SULFIDE AND LACTIC ACID ON CYTOCHROME C OXIDASE ACTIVITIES IN PLANT ROOTS**

*QUISPE, NAOMI* (Department of Biological Sciences, Fort Hays State University [ncquispe@mail.fhsu.edu]), *Brian Maricle* (Department of Biological Sciences, Fort Hays State University [brmaricle@fhsu.edu])

#### **EFFECTS OF LACTIC ACID AND SULFIDE ON ENZYMES OF RESPIRATION IN CATFISH TISSUE**

*URBAN, ADAM* (Department of Biological Sciences, Fort Hays State University [adurban2@mail.fhsu.edu]), *Yasuhiro Kobayashi* (Department of Biological Sciences, Fort Hays State University [y\_kobayashi@fhsu.edu]), *Brian Maricle* (Department of Biological Sciences, Fort Hays State University [brmaricle@fhsu.edu])

#### **USE OF LOW-DENSITY LIPOPROTEIN RECEPTOR AND VERY LOW-DENSITY LIPOPROTEIN RECEPTOR AS POTENTIAL GENETIC MARKERS TO INVESTIGATE THE DEVELOPMENT OF OBESITY IN A NON-MODEL FISH SPECIES, *ICTALURUS PUNCTATUS***

*ORDONEZ-CASTILLO, NORELIA* (Biological Sciences Department [nmordonezcastillo@mail.fhsu.edu]), *Oaklee Abernathy* (Biological Sciences Department [olabernathy@mail.fhsu.edu]), *Rebekah Spainhour* (Biological Sciences Department [r\_spainhour@mail.fhsu.edu]), *Yass Kobayashi* (Biological Sciences Department [y\_kobayashi@fhsu.edu])

#### Chemistry/Biochemistry

#### **IDENTIFICATION AND QUANTIFICATION OF IBUPROFEN IN BLOOD USING HPLC-UV/VIS.**

*THIMMESCH, JANELLE* (The Master of Science in Forensic Science Program, the Departments of Biological Sciences and Physical Sciences Emporia State University [jthimmes@g.emporia.edu])

**SOXHLET EXTRACTION OF AVOCADO ENDOCARP AND TRITURATION OF AVOCADO MESOCARP FOR BIO-DIESEL PRODUCTION**

*ORAEMESI, IFEOMA* (Department of Biological Sciences, Fort Hays State University [isoraemesi@mail.fhsu.edu]), *Brian Maricle* (Department of Biological Sciences, Fort Hays State University [brmaricle@fhsu.edu]), *Arvin Cruz* (Department of Chemistry, Fort Hays State University [ajacruz2@fhsu.edu])

**SYNTHESIS OF EXPANDED OXOPHLORINS**

*HALLER, RYAN* (Department of Chemistry, Washburn University [ryan.haller@washburn.edu])

**SYNTHESIS AND PROPERTIES OF OXYGEN-BRIDGED TRIANGULENIUM DYE**

*TRUMP, ERIC* (Department of Chemistry, Emporia State University [etrump@emporia.edu]), *Amri Nasser* (Department of Chemistry, Emporia State University [namri@g.emporia.edu])

**PHOTOSYNTHETIC ACTION SPECTRA OF ETIOLATED BEANS DURING GREENING**

*KRISS, TAYLER* (Department of Biology, Fort Hays State University [tjkriss@mail.fhsu.edu]), *Brian Maricle* (Department of Biological Sciences, Fort Hays State University [brmaricle@fhsu.edu])

**SCHIFF BASE CYCLIZATION TO FORM A CROSS-PROTECTED TETRAAZAMACROCYCLE**

*DENTON, CHRISTOPHER* (Department of Chemistry, Washburn University [christopher.denton@washburn.edu]), *Shaun Schmidt* (Department of Chemistry, Washburn University [shaun.schmidt@washburn.edu])

**SOLVENT-FREE SYNTHESIS OF BIOLOGICALLY ACTIVE STILBENE DERIVATIVES**

*COOPER, DEKEYSHA* (Department of Chemistry, Washburn University [dekeysha.cooper@washburn.edu]), *Stephen Angel* (Department of Chemistry, Washburn University [stephen.angel@washburn.edu])

**ISOLATION OF THE AZAMACROCYCLES FORMED FROM THE DETOSYLATION OF CYCLIC TOSYLAMIDES**

*HEFFREN, PAUL* (Department of Chemistry, Washburn University [paul.heffren1@washburn.edu]), *Shaun Schmidt* (Department of Chemistry, Washburn University [shaun.schmidt@washburn.edu])

Computer Science

**ASA H FORMS A CONCEPT OF SELF**

*JONES, ROBERT* (Physical Science Department, Emporia State University [rjones@emporia.edu])

Ecology/Organismal Biology

**DISCOVERY OF NOVEL BACTERIA SHOWING ANTIMICROBIAL CHARACTERISTICS AGAINST E.S.K.A.P.E PATHOGEN RELATIVES**

*MONTGOMERY, SAMI* (Department of Biology, Fort Hays State University [samimontgomery22@gmail.com]), *ZIMMERMANN, WENDY* (Department of Biology, Fort Hays State University [wmzimmerman@mail.fhsu.edu]), *CARVALHO, TAISSA* (Department of Psychology, Fort Hays State University [ttdasilvacarvalho@mail.fhsu.edu])

**FLORISTIC SURVEY DOCUMENTS 100 RECORDS FOR OTTAWA COUNTY, AND 5 STATE RECORDS FOR OKLAHOMA**

*SNOW, NEIL* (Department of Biology, Pittsburg State University [nsnow@pittstate.edu]), *Samantha Young* (Department of Biology, Pittsburg State University [syoung@gus.pittstate.edu]), *Chance Curran* (Department of Biology, Pittsburg State University [kskid34@yahoo.com]), *John Kartesz* (Biota of North America Program (BONAP) [john.kartesz@yahoo.com])

**INVESTIGATING FLORAL DIVERSITY OF WESTERN KANSAS GRASSLANDS TO ASSESS POLLINATOR PRODUCTIVITY**

*ENGEL, RYAN* (Department of Biological Sciences, Fort Hays State University [rpengel@mail.fhsu.edu]), *Keri Caudle* (Department of Biological Sciences, Fort Hays State University [klcaudle@mail.fhsu.edu])

**HERBIVORY PREFERENCES AMONG ECOTYPES OF BIG BLUESTEM (*ANDROPOGON GERARDII*)**

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**IDENTIFYING HABITAT STRUCTURE OF HERPETOFAUNAL COMMUNITIES WITH UAS TECHNOLOGY**

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**PRELIMINARY ANALYSIS OF A SURVEY OF CHYTRID IN KANSAS**

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**INSECT FORAGERS ON TALL THISTLE, *CIRSIMUM ALTISSIMUM* (L.) SPRENG., AND LATE BONESET, *EUPATORIUM SEROTINUM* MICHX., IN CHEROKEE COUNTY, KANSAS**

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**WHITE-TAILED DEER HERBIVORY PREFERENCE OF TREE SAPLINGS IN THE RIPARIAN ZONES OF KONZA PRAIRIE**

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**DETERMINING THE EFFECTS OF COMPOSTABLE PACKING PEANUTS ON BIOMASS PRODUCTION OF A COMMON CROP SPECIES**

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**THE BIRD'S BIGGEST FAN: WIND TURBINE EFFECTS ON BREEDING BIRD HABITAT SELECTION**

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**TARDIGRADES OF THE CANOPY: POTENTIAL FOR AVIAN-MEDIATED LONG DISTANCE DISPERSAL IN AMERICAN TARDIGRADES**

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**TARDIGRADES OF NORTH AMERICA: PRELIMINARY COMPARATIVE X-RAY ELEMENTAL ANALYSIS OF LICHEN HABITAT**

*TOME, MARIA FLORES* (Department of Mathematics and Physics [William.Miller@BakerU.edu]), *Andrew Emanuels* (Department of Biology and Chemistry [William.Miller@BakerU.edu]), *Colton Stallard* (Department of Biology and Chemistry [William.Miller@BakerU.edu]), *Mahmoud Al-Kofahi* (Department of Mathematics and Physics [William.Miller@BakerU.edu]), *William R. Miller* (Department of biology and Chemistry [William.Miller@BakerU.edu])

Geology/Paleontology

**UPLAND CHERT GRAVEL IN THE EMPORIA, KANSAS VICINITY: NEW EXPOSURES, OBSERVATIONS, AND STRATIGRAPHIC PROPOSAL**

*ABER, JAMES* (Earth Science, Emporia State University [aberjim99@aim.com])

**THE EFFICACY OF ACQUIRING STRIKE-AND-DIP FROM HIGH RESOLUTION IMAGERY AND LIDAR IN THE FLINT HILLS OF CHASE COUNTY, KANSAS**

*PETERSON, ALAN* (Emporia State University [apeters3@g.emporia.edu])

**SUSTAINABILITY OF THE HIGH PLAINS AQUIFER IN THE GROUNDWATER MANAGEMENT DISTRICTS OF KANSAS**

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Health and Medicine

**PREVALENCE OF ANAPLASMA BOVIS IN YEARLING HEIFERS IN WESTERN KANSAS**

*RIDDER, JARED* (Department of Biological Sciences, Fort Hays State University [jrridder@mail.fhsu.edu]), *Lacy O'Neal* (Department of Biological Sciences, Fort Hays State University [ljoneal@mail.fhsu.edu]), *Marissa Bland* (Department of Agriculture, Fort Hays State University [mkbland@mail.fhsu.edu]), *Robert Keener* (Department of Agriculture, Fort Hays State University [rjkeener@mail.fhsu.edu]), *Yass Kobayashi* (Department of Biological Sciences, Fort Hays State University [y\_kobayashi@fhsu.edu])

Physics/Astronomy

**TARDIGRADES OF THE CANOPY: PRELIMINARY COMPARATIVE X-RAY ELEMENTAL ANALYSIS OF LICHEN HABITAT**

*TOME, MARIA FLORES* (Department of Mathematics and Physics, Baker University), *Andrew Emanuels* (Department of Biology and Chemistry, Baker University), *Colton Stallard* (Department of Biology and Chemistry, Baker University), *Mahmoud Al-Kofahi* (Department of Mathematics and Physics, Baker University)



## Abstracts

Alphabetical by presenting author by subject area

### ANTHROPOLOGY/ARCHEOLOGY

#### **ANALYSIS OF ROMAN COINS USING XRF TECHNIQUES**

Analysis of Roman Coins Using XRF Techniques Aaron Brooks<sup>1</sup>, John Ritchards<sup>2</sup>, and Mahmoud Al-Kofahi<sup>1</sup> <sup>1</sup>Department of Physics, Baker University, Baldwin City, KS 66006 <sup>2</sup>Department of History, Baker University, Baldwin City, KS 66006 Abstract Six ancient coins (bronze coins) from the second and third centuries of the Great Roman Empire were analyzed using x-ray fluorescence techniques. The coins were found to have compositions ranging from about 67.5 to 93.3 wt% Copper. In addition to Copper, the major constituents of the coins, with concentrations of 1% or more, were Pb, Si, and Sn. The minor constituents, with concentrations between 0.1 and 1 wt% were Al, Ag, P, S, Mg, Fe, and As. Trace elements with concentrations of less than 0.1 wt% were Ta, Ni, Mn, Co, V, and Au. The correlation between the composition of each coin and the historical implications was studied, and a possible explanation for the significant variations in the compositions of the coins is given. Before the analysis of the samples, each coin was cleaned with a silk brush then with warm water and soap in preparation for the analysis. Then a Rigaku NEX CG EDXRF (Energy Dispersive X-Ray Fluorescence) analyzer was used to determine the stoichiometry of the samples. The NEX CG spectrometer is capable of detecting and measuring the concentrations of elements from Na to U with ppm levels. This preliminary project is aimed at starting a new interdisciplinary research area between the departments of Physics and History at Baker University. Keywords: XRF Analysis, Roman Coins.

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Presentation Type: Oral

Award: Undergraduate

TH 112 —9:10

#### **MAGNETOMETER SURVEY: AN ATTEMPT TO LOCATE SUSPECT, UNMARKED GRAVES AT THE B.O.D. LOOKOUT STATION 1867 ATTACK SITE NEAR ANTONINO, KANSAS**

A cesium vapor Geometrics G-858 magnetometer survey was conducted on May 21, 2016 on Mr. Don Befort's property located approximately one mile east of Antonino, Kansas in Ellis County along Lookout Creek. This site was the location of the B.O.D. freight delivery called Lookout Station. The purpose of the survey was an attempt to target suspect, unmarked human grave positions and their possible depths. Two small high-low doublet magnetic anomalies, one being 18 gammas and the other 3 gammas, were located along the eastern edge of the surveyed area. Possible materials beneath these small anomalies are most likely iron-bearing objects estimated to be approximately 1-3 feet down. One seven gamma anomaly was found directly over the suspect graves as targeted by other investigators. However, this anomaly although linear in a north-south direction does not have a typical high-low doublet often associated with iron-bearing materials. On the other hand, an approximate depth for this anomaly is 3-4 feet and surprisingly similar to the estimated depth of the suspect graves by other investigators. Two other small anomalies were also present along the same profile as the suspect graves and again are most likely iron-bearing materials estimated to be 2 to 5 feet in depth.

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Presentation Type: Oral

Award: Not Competing

TH 112 —8:10

#### **MAGNETOMETER SURVEYS: ATTEMPTS AND ISSUES IN LOCATING A 1948 PRIVATE WATER WELL ON THE SHORE OF LAC SAULT DORE, PRICE COUNTY, WISCONSIN**

Two different magnetometer surveys in northern Wisconsin during the summers of 1997 and 2010, using two different Geometrics magnetometers, a proton precession G-816 unit and a cesium vapor G-858 unit, in an attempt to locate a surface-target position of and depth to an abandoned 1948 private water well, successfully targeted the suspect surface position and the depth to the well head spike. Both surveys detected 400-gamma anomalies and estimated the depth to the spike at 2 meters. A land owner private family photograph taken in 1951 was used to compare the anomaly's position to the actual surface position of the well. Two, three-foot deep pits were hand dug in 2004 in an attempt to excavate, remove and replace the well spike; however, the attempt was not successful due to large trees, roots, and available equipment. For aesthetic reasons, the land owners were reluctant to cut the trees down at that time in order to continue excavation. After another 2010 magnetometer spot check, a second excavation attempt was not made, and any future attempts are pending.

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Presentation Type: Oral

Award: Not Competing

TH 112 —8:30

### CELL BIOLOGY/GENETICS

#### **THE LINK BETWEEN OBESITY AND THE EXPRESSION OF O-LINKED N-ACETYLGLUCOSAMINE TRANSFERASE IN *ICTALURUS PUNCTATUS***

The obesity epidemic in the United States is a serious concern that has driven researchers to determine genetic mechanisms that may contribute to its development. Previous studies in mice have shown that O-linked N-acetylglucosamine transferase (OGT) may serve as a satiety factor responsible for controlling food intake and body weight. OGT appears to signal "fullness" in the brain, and decreased OGT expression leads to massive weight gain and development of an obese phenotype in mice. In Channel Catfish, genetic selection toward increased growth often leads to the increased accumulation of fats in the abdomen, suggesting that Channel Catfish can be used as a model organism to study obesity development in humans. Screening of the catfish genome database yielded four highly homologous OGT transcripts. Primers were designed to discriminate two major transcripts containing a fifty base pair insert from the other two transcripts. The nucleotide sequence of amplicon corresponding to OGT transcripts was highly similar (>80%) to those of other fish. Because OGT expression in channel catfish has not been previously studied, the OGT expression was examined in the cDNA of brain, spleen, trunk kidney, liver, Brockman's body, and muscle tissues of "normal" phenotype catfish using RT-PCR. OGT expression was detected in all tissues and was expressed at various levels. Currently, we are using RT-PCR to determine quantities of OGT in the tissues. In future research, we will compare OGT expression in obese phenotype catfish to normal phenotype catfish and determine if OGT expression is

decreased in obese catfish.

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Presentation Type: Poster Award: Master's graduate student

#### **ANALYZING PROTEIN INTERACTIONS OF THE HERPES SIMPLEX VIRUS TYPE 1 UL34 PROTEIN**

Herpes Simplex Virus-1 (HSV-1) is easily communicable and infection can present in many ways including cold sores, genital herpes, herpes whitlow, and more. HSV-1 proliferates within the host cell nucleus. Once replication is completed the virus exits the nucleus. Viral protein UL34 is essential for the virus to begin exiting the cell. It is unknown which nuclear proteins UL34 is interacting with during this step. UL34 is a highly conserved protein in all human herpesviruses and an ideal candidate for future drug treatments. Understanding interactions between UL34 and host nuclear proteins could potential lead to a drug that prevents herpesviruses from leaving the nucleus of infected cells. To determine interaction partners for UL34, pulldown assays were performed. In a pulldown assay, purified UL34 protein is mixed with HEP-2 cell lysate, and then UL34 and any binding partners are removed from the mixture. In addition to our normal pulldown procedure we preformed washing steps to eliminate nonspecific binding partners. Our results showed continued pulldowns of UL34. Our results also showed potential binding partners. Future steps will include alteration of the protocol to strengthen binding during the assay. Once stronger protein interactions occur we will perform isolation experiments to identify binding proteins.

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TH 112 —1:30

#### **DIFFERENTIAL EXPRESSION OF ALDH1 AND NRF2 AT THE PROTEOMIC LEVEL IN SUBTYPES OF HUMAN OVARIAN CANCER CELL-LINES.**

Ovarian carcinoma is the most lethal of all known gynecological tumors with 225,000 new cases diagnosed and 140,000 deaths occurring annually worldwide. Even after surgery and chemotherapy, cancer recurrence happens due to the presence of a small population of tumorigenic cancer stem cells. Recent studies in solid tumors of the ovary, colon, breast, head and neck, and lung showed that Aldehyde Dehydrogenase (ALDH) is a potential biomarker for carcinoma plus for cancer stem cells and is a poor prognostic marker. In the ALDH1 super family, the activity of ALDH1A1 is elevated in sphere-forming and stem cells in different systems. In the present project, we assessed the expression of ALDH1 and other protein targets in high-grade and low-grade cultured cancer cell lines using Western blot analysis of total protein extracts obtained from mono-layer confluent cultures. Our observations were: 1) Under the growth conditions used, no cell-line expressed ALDH1 in total protein extracts; 2) Nrf2, a key factor in the anti-oxidant response element system, was detected as a series of protein bands of variable molecular weight in extracts from all but the Kuramochi (HGSOC) cell line; and 3) GAPDH and  $\beta$ -actin, commonly known as house-keeping gene products, were probed as positive controls to ascertain efficiency of the system and they were similarly expressed in all the cell-lines. We will next analyze these and other targets using immunohistochemistry to assess their precise localization and relative expression levels at the individual cell level.

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TH 112 —1:50

#### **TREATMENT WITH STREPTOZOTOCIN (STZ) CAUSES HYPOGLYCEMIA AND ALTERS THE STABILITY OF REFERENCE GENES FOR REAL-TIME PCR ANALYSIS IN THE LIVER OF CHANNEL CATFISH**

Streptozotocin (STZ) treatment induces hyperglycemia in mammals and some fish species. However, the effects of STZ treatment on blood glucose level as well as other physiological parameters in Channel Catfish have never been examined in detail. In this study, we tested the hypothesis that STZ treatment affects blood glucose level and hepatic expression of genes commonly used as reference for real-time PCR. Juvenile channel catfish were treated with 0, 3.6, 36, 180, or 360 mg/kg STZ intraperitoneally on day 0 (n=4 fish/treatment). Blood glucose level was measured and liver, muscle and brain samples were collected 7 days after STZ treatment. Expression of five common housekeeping genes (beta-microglobulin, alpha-tubulin, 18s ribosomal RNA, beta-actin, and GAPDH) were measured using real-time PCR. Blood glucose levels decreased in fish treated with 180 or 360 mg/kg STZ compared to fish treated with 0 mg/kg STZ. Treatment with STZ at higher doses altered expression of 4 housekeeping genes. Expression of beta-microglobulin, alpha-tubulin, and beta-actin mRNA was higher in fish treated with higher doses of STZ compared to 0 mg/kg STZ. In contrast, expression of GAPDH mRNA tended to be less in 360 mg/kg STZ than 0 mg/kg STZ. Expression of 18s rRNA was not affected by STZ treatment. Rather than causing hyperglycemia, treatment with high doses of STZ decreased blood glucose level in Channel Catfish, suggesting a difference in glucose metabolism exists between Channel Catfish and humans. This study is supported by APS IOSP fellowship program and Kansas Idea Network of Biomedical Research Excellence (P20GM10348).

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Presentation Type: Poster Award: Undergraduate

#### **USE OF LOW-DENSITY LIPOPROTEIN RECEPTOR AND VERY LOW-DENSITY LIPOPROTEIN RECEPTOR AS POTENTIAL GENETIC MARKERS TO INVESTIGATE THE DEVELOPMENT OF OBESITY IN A NON-MODEL FISH SPECIES, ICTALURUS PUNCTATUS**

Dyslipidemia is a metabolic disorder that often develops in association with obesity. Most research regarding human metabolic disorders, including dyslipidemia, has been conducted using rodents. However, Channel Catfish (*Ictalurus punctatus*) selected for increased growth often develop obese-like phenotype with increased fat accumulation in the abdomen, suggesting Channel Catfish can be useful in investigating the mechanism(s) associated with development of obesity in humans. Objectives of this experiment were to identify the genes encoding mRNA for two low density lipoprotein receptors (LDLrA and LDLrB) and examine their tissue distributions in Channel Catfish. In addition, mRNA encoding very low density lipoprotein receptor (VLDLr) was identified and characterized. Channel Catfish LDLrA, LDLrB, and VLDLr mRNA sequences were identified by screening the channel catfish genome database and their expression was examined in the brain, spleen, trunk kidney, liver, Bockmann's body, and muscle. The PCR amplicon for respective mRNA was highly similar (>70%) with other species of fish. The sequenc-

es of LDLrA and LDLrB mRNA also shared a high degree of similarities (>65%) with rodents and humans. Expression of LDLrA and VLDLr mRNA sequences were detected at various levels in all tissues examined. LDLrB mRNA sequences were also detected at various levels in all tissues except in the brain. Currently, the changes in expression of the three mRNA expressions in relation to changes in food intake and development of obese-like phenotype are being investigated. This research is supported by the Kansas Idea Network of Biomedical Research Excellence (P20GM103418).

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Presentation Type: Poster Award: Undergraduate

#### **EFFECTS OF SULFIDE AND LACTIC ACID ON CYTOCHROME C OXIDASE ACTIVITIES IN PLANT ROOTS**

Sulfide and lactic acid are well known as metabolic toxins, yet specific effects of sulfide and lactic acid on respiration enzymes have not been characterized. The objective of this study was to analyze sulfide and lactic acid toxicity on activities of the enzyme cytochrome c oxidase (CytOx), which is active in oxidative phosphorylation in mitochondria. CytOx activity was measured in tissue homogenates from roots of several plant species. Enzyme activity was measured in the presence of 0, 5, 10, 15, and 20  $\mu\text{M}$  sulfide and 0, 1, 10, 50, and 100 mM lactic acid. Increasing sulfide and lactic acid concentration significantly decreased activity in CytOx, however sulfide toxicity had a greater effect on the enzyme compared to lactic acid toxicity. Sulfide was a potent metabolic toxin; activity of CytOx was as high as 0.106  $\mu\text{mol min}^{-1} \text{g}^{-1}$  in the absence of sulfide, but was significantly reduced at 5  $\mu\text{M}$  sulfide. Lactic acid also reduced CytOx activities. Activity of CytOx was as high as 0.134  $\mu\text{mol min}^{-1} \text{g}^{-1}$  in lactic acid experiments. Increasing lactic acid concentrations caused a threshold response, where CytOx was not affected until 100 mM lactic acid. Both sulfide and lactic acid influence activities of CytOx, but to different degrees, indicating environmental and physiological constraints on plant metabolism, particularly with respect to sulfide exposure and its effects on respiration. Specific mechanisms of inhibition are currently under investigation.

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Presentation Type: Poster Award: Undergraduate

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

Anthropogenic activities have severely altered the earth's ecosystems, driving many species to undergo rapid evolution in response to extreme and changing environmental conditions. My research investigates 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. The study area is the Tar Creek EPA Superfund Site, an abandoned Lead and Zinc mine active for 100 years that spans Kansas, Oklahoma, and Missouri. Using a greenhouse soil reciprocal transplant, I am comparing populations of *A. virginicus* collected from Tar Creek with those collected from nearby non-mine sites to determine if ecotypic adaptation to contaminated soils has occurred in mine populations. To assess phenotypic adaptation, I have measured vegetative morphology (height, biomass), fitness (seed production), and physiology (photosynthesis, SPAD) over the course of the growing season. Plants from 20 populations have been genotyped with GBS to analyze differentiation on the genetic level. We identified ~6,000 single nucleotide polymorphisms (SNPs), including 47 outliers under divergent selection between mine and non-mine populations, two of which are related to Zinc binding. For both of these SNPs, a single allele is fixed in the mine populations while both alleles are present in equal frequency in non-mine populations, indicating greater selection for one allele variant in the mine site. Preliminary evidence supports phenotypic differences between mine and non-mine populations, including a potential trade off in mine populations between reproduction and vegetative growth. In a greenhouse reciprocal soil transplant, plants from mine populations produced more biomass than plants from old field populations, but mine plants were half as likely to flower as old field plants. These results indicate genotypic and phenotypic divergence between mine and non-mine populations linked to metal tolerance. To further compare genomic divergence and phenotypic plasticity in mine and non-mine populations, I will next perform a field reciprocal transplant with mine and non-mine plants, as well as additional genomic and transcriptomic comparisons.

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Presentation Type: Oral Award: None TH 112 —2:10

#### **USE OF MTOR AS A POTENTIAL MOLECULAR MARKER TO INVESTIGATE THE DEVELOPMENT OF OBESITY IN NON-MODEL FISH SPECIES**

Objectives of this study were to identify the genes encoding mechanistic target of rapamycin (mTOR) in Channel Catfish and examine their tissue distribution. mTOR plays a key role in the regulation of protein synthesis, cell growth, cell proliferation, and nutrient metabolism. Therefore, functions of mTOR have been investigated in association with obesity and diabetes development. In Channel Catfish, genetic selection toward growth causes the development of obese-like phenotype, which suggests that channel catfish can serve as an alternative model to investigate obesity and diabetes development. However, little is known about the role of mTOR in channel catfish. Genes encoding mTOR were identified by screening the Channel Catfish genome database. The expression of various mTOR mRNA was examined in the cDNA of brain, spleen, trunk kidney, liver, Brockmann body and muscle tissues using RT-PCR. With the exception of the brain, mTOR mRNA expression was detectable in all tissues examined at varied degree. The nucleotide sequence of amplicon corresponding mTOR (480 bp) was highly similar to those of other fish (>80%), as well as that of mice (>78%), and humans (>79%). Currently, we are investigating changes in expression of mTOR mRNA in relation to changes in food intake and genetic selection toward growth in channel catfish. This study is supported by the Kansas IDEa Network of Biomedical Research Excellence.

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Presentation Type: Poster Award: Undergraduate

#### **EFFECTS OF LACTIC ACID AND SULFIDE ON ENZYMES OF RESPIRATION IN CATFISH TISSUE**

Lactic acid can accumulate in tissues of animals during periods of fermentation, potentially resulting in impaired muscle function following strenuous exercise. Sulfide is an environmental toxin that can inhibit respiration. However, specific toxicity of lactic acid and sulfide on tissue metabolism is unclear. The objective of this study was to investigate lactic acid and sulfide toxicity on activities of the enzymes lactate dehydrogenase (LDH), citrate synthase (CS), and cytochrome c oxidase (CytOx),

each essential to one of the three phases of respiration. LDH, CS, and CytOx activity were measured in tissue homogenates from liver and muscle in Channel Catfish. Enzyme activity was measured in the presence of 0, 1, 10, 50, and 100 mM lactic acid and 0, 5, 10, 15, and 20  $\mu$ M sulfide. LDH activities were higher in muscle when compared to liver, whereas CytOx activity was higher in liver than muscle. LDH activity in liver appeared to be more sensitive to lactic acid toxicity when compared to CS and CytOx. CytOx was more sensitive to sulfide compared to LDH. Increasing lactic acid concentration decreased LDH activity in a dose-dependent manner. CS and CytOx displayed a threshold response, where activities did not decrease until tissues were exposed to 50 mM lactic acid. Lactic acid influenced activities of enzymes involved in all stages of cellular respiration, suggesting accumulation of lactic acid could lead to impaired cellular metabolism in animal tissues. CytOx was very sensitive to sulfide whereas LDH was more tolerant.

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*Presentation Type: Poster* *Award: Undergraduate*

## CHEMISTRY/BIOCHEMISTRY

### SOLVENT-FREE SYNTHESIS OF BIOLOGICALLY ACTIVE STILBENE DERIVATIVES

Solvent-free synthesis of reactions have been increasing in recent years. Reactions such as Aldol condensation, etherification of alcohols, Baeyer-Villiger oxidation, have been completed in the absence of a solvent. The solvent-free Wittig reaction is used to make (E) & (Z) Resveratrol trimethyl ether, used in treatments of cancer. In general, the Wittig reaction is used to form carbon-carbon double bonds. The reaction forms an ylide from a triphenylphosphonium salt and then the base reacts with an aldehyde/ketone which forms the alkene and a triphenylphosphine oxide. The reaction time can be shortened by using a high-energy ball mill (HEBM) and a mild hygroscopic base. Completion of the reaction was monitored using quantitative proton nuclear magnetic resonance spectroscopy (1H-NMR). Thin layer and column chromatography were used. Adjustment of the mobile phase to help with separation were tried in isolation of (E) & (Z) Resveratrol trimethyl ether. To further reduce solvent, column chromatography was replaced by catalytic diphenyl disulfide Isomerization.

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*Presentation Type: Poster* *Award: Undergraduate*

### SCHIFF BASE CYCLIZATION TO FORM A CROSS-PROTECTED TETRAAZAMACROCYCLE

For many years, macrocycles have been used as "hosts" to carry imaging agents through the body. [46]Adamanzane is envisioned to be an alternative to the macrocycles currently used due to the advantages of its potential chemical inertness from the total encapsulation of the metal ion. Milligram scale synthesis of 1,11-diaza-6,16-ditosylamidacycloicosane, a key intermediate in the synthesis of the final target compound [46]adamanzane, has been achieved by a slow-addition, high-dilution Schiff base condensation between a diamine and dialdehyde using titanium isopropoxide to absorb water produced by the condensation reaction. The initial step in this synthesis is the dialkylation of 4-toluenesulfanamide, which generates the initial two of four amine vertices. The terminal nitrile groups of the protected dialkylated product are selectively reduced into the respective diamine and dialdehyde halves. These halves are condensed together, then reduced to generate the last two amine vertices of [46]adamanzane. The last two amine vertices are then allylated to generate the allylamine group necessary for ring closing metathesis. The first two amine vertices would need detosylated before allylation could occur. However, detosylation of similar protected macrocyclic compounds has been problematic. In an effort to circumvent protecting groups and further study the synthesis of our final target compound, an alternative, more atom-efficient synthetic pathway building off of the unprotected allylamine group is currently being researched.

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*Presentation Type: Poster* *Award: Undergraduate*

### THE EFFECT OF PH ON GOSSYPOL INHIBITION OF RABBIT MUSCLE LACTATE DEHYDROGENASE

Lactate Dehydrogenase (LDH) catalyzes the anaerobic reaction between pyruvate and lactate and is necessary for regeneration of cellular NAD<sup>+</sup>. Inhibition of this pathway has been shown to have beneficial effects in some cases. Recent studies indicate that inhibiting LDH will cause oxidative stress in malignant cells, hence limiting tumor propagation. Gossypol and its derivatives are compounds isolated from cottonseed oil and are potent inhibitors of LDH. However, the activity of gossypol within an acidic environment, such as found in cancer cells, is not known. In this research, the inhibition of rabbit muscle LDH was tested at pH levels 6, 7, and 8. The results show that gossypol strongly inhibits LDH at pH 6, while only moderately inhibiting LDH at pH 7 and 8. The  $K_i$  value at pH 6 was found to be 0.001 mM compared with 0.082 mM at pH 7 and 0.107 mM at pH 8. These results indicate that LDH in acidic environments requires a lesser concentration of gossypol to achieve inhibition than at biological pH. This suggests that gossypol-like inhibitors could possibly be used to selectively inhibit LDH functions under acidic conditions such as those found in cancer cells.

**FINCH, NATHAN** (Department of Natural Sciences, McPherson College, McPherson, KS [nathanjfinch@gmail.com]), **Allan Ayella** (Department of Natural Sciences, McPherson College, McPherson, KS [ayellaa@mcpherson.edu])  
*Presentation Type: Oral* *Award: Undergraduate* *TH 124 —9:10*

### ANALYSIS OF MELAMINE IN PET FOODS USING GOLD NANOPARTICLES

The purpose of this research is to analyze the presence of melamine in pet food with the use of gold nanoparticles. Melamine has been widely used in things such as fertilizer, flame retardant, and resin. However, due to its low cost and high Nitrogen content, there has been evidence that it has been illegally added to various foods and products—particularly pet food and infant formula—to falsely increase the apparent protein content. The addition of Melamine to various food and dairy products has huge consequences, because when it is consumed, it combines with cyanuric acid which forms insoluble crystals in the kidneys. Gold nanoparticles (GNPs) have excellent optical properties, and can be used as a colorimetric probe to detect for the presence of melamine. Furthermore, when GNPs are in their colloidal state they exhibit a wine-red color, however, in the presence of Melamine, GNPs aggregate which causes the solution to change color to blue. The aggregation-based change in color can also be verified through UV-Vis spectroscopy.

**GOODROW, ELIZABETH** (Washburn University [elizabeth.goodrow@washburn.edu])  
*Presentation Type: Oral* *Award: Undergraduate* *TH 124 —9:30*

### SYNTHESIS OF EXPANDED OXOPHLOLINS

Expanded oxophlorins are substances that could absorb within the visible spectrum of light. This can be useful as an alternative for cancer treatment in photodynamic therapy (PDT). One way to synthesize expanded oxophlorins is to synthesize a dipyrrolyl- $\alpha,\beta$ -unsaturated ketone. This can then be combined with a dipyrromethane. Since the dipyrrolyl- $\alpha,\beta$ -unsaturated ketones are unknown, much of our research has been focused on this. We have been using aldol condensation and Wittig reactions in this synthesis. While aldol condensation has not been effective, the Wittig reaction has been successfully used to synthesize a precursor to the dipyrrolyl- $\alpha,\beta$ -unsaturated ketone, but it has not been purified due to insufficient materials. An alternative dipyrrolyl- $\alpha,\beta$ -unsaturated ketone with one fewer carbon-carbon double bond has successfully been synthesized, and the synthesis of an expanded oxophlorin was attempted. However, because the reaction scale was too small, success of the reaction could not be determined. Further studies must be performed by increasing the reaction scale.

**HALLER, RYAN** (Department of Chemistry, Washburn University [ryan.haller@washburn.edu])

Presentation Type: Poster

Award: Undergraduate

### ISOLATION OF THE AZAMACROCYCLES FORMED FROM THE DETOSYLATION OF CYCLIC TOSYLAMIDES

Azamacrocycles are used in medical imaging and treatment. The synthesis of these structures requires that the amine groups in the structure be protected from side reactions. Acid hydrolysis deprotection from tosylamide to amine is problematic, but microwave-assisted deprotection has shown promise. Microwave-assisted acid hydrolysis of tosylamides was investigated using varying solvent composition and heating schemes. Microwave-assisted base hydrolysis using high-boiling solvent was tested as an alternative. In both major microwave-assisted schemes, an Anton Paar Monowave 400 pressurized microwave reactor was used. In addition, reductive cleavage methods were explored using sodium naphthalenide at standard temperature and pressure. Complete deprotection was achieved using microwave-assisted acid hydrolysis. Reductive deprotection produced a mixture of partially deprotected tosylamides and unknown side-products. While complete deprotection was achieved using microwave-assisted acid hydrolysis, the reactor vessel remained pressurized after the heating cycle was complete, and most of the reaction mixture was lost due to explosive effervescence of the mixture. Future investigations will focus on optimization of this procedure and its compatibility with the pressurized reaction system.

**HEFFREN, PAUL** (Department of Chemistry, Washburn University [paul.heffren1@washburn.edu]), **Shaun Schmidt** (Department of Chemistry, Washburn University [shaun.schmidt@washburn.edu])

Presentation Type: Poster

Award: Undergraduate

### PHOTOSYNTHETIC ACTION SPECTRA OF ETIOLATED BEANS DURING GREENING

How varying wavelengths of light drive photosynthesis has not been investigated during the period when young plants are transitioning from an etiolated state to a green state. In this study, photosynthetic rates of young bean plants were analyzed in light with wavelengths of 350 nm to 750 nm. Isolated thylakoids were analyzed spectrophotometrically with an artificial electron acceptor (DCIP, a Hill reagent) to measure the light reactions of photosynthesis. Monochromatic light was supplied by a spectrophotometer, and samples were illuminated at a specific wavelength for five minutes. Another spectrophotometer measured difference in absorbance as the Hill reagent in solution was reduced by electron transfer in the light reactions of photosynthesis. Plants were germinated in the dark for 14 days and then moved into sunlight. Analysis was done at 0, 3, 7, and 21 days of light exposure. These were the first action spectra of photosynthesis measured during greening in etiolated seedlings. Blue and red wavelengths of light were most effective at driving the light reactions of photosynthesis, but not during the initial few days of greening. Photosynthetic rates, calculated by use of the Hill reaction, were minimal until 7 days of sunlight exposure, but were evident thereafter. This work shows spectrophotometers can be used as an illuminating source to measure action spectra of photosynthesis. This allows action spectra to be constructed for small-scale reactions without the need for sophisticated equipment.

**KRISS, TAYLER** (Department of Biology, Fort Hays State University [tjkriss@mail.fhsu.edu]), **Brian Maricle** (Department of Biological Sciences, Fort Hays State University [brmaricle@fhsu.edu])

Presentation Type: Poster

Award: Undergraduate

### SOXHLET EXTRACTION OF AVOCADO ENDOCARP AND TRITURATION OF AVOCADO MESOCARP FOR BIODIESEL PRODUCTION

Finding alternative sources of renewable energy is on the rise globally. Renewable sources of energy are advantageous because they are biodegradable, less toxic, and combust efficiently. More importantly, raw materials for these sources can be replenished. One alternative source of energy is biodiesel. Biodiesel is a fuel which consists of mono-alkyl esters of long-chained fatty acids obtained from vegetable oil or animal fats. They serve as efficient fuels to run diesel engines. Biodiesel is produced via transesterification of oils wherein glycerine is a by-product. Avocado (*Persea americana*) is a fleshy fruit with high lipid content, mostly monounsaturated fats, which amounts to 70% of its lipid content. These fruits serve as viable sources of biodiesel. In this research, we used the Soxhlet extraction to extract oil from the stony endocarp and trituration/geometric dilution to extract oil from fleshy mesocarp to produce biodiesel. The solvent used in both methods was hexane. About 0.48 ml of oil per g tissue was obtained from the avocado mesocarp via trituration extraction technique compared to 0.025 ml of oil per g tissue extracted from avocado endocarp via soxhlet extraction. Oils extracted were analysed using GC-MS and were composed of fatty acids like oleic acid, palmitoleic acid, stearic acid, arachidonic acid, and myristic acid. These fatty acids were transesterified to investigate potential for biodiesel production. Avocado's high lipid content can be explored in the area of renewable energy. The mixture of saturated and unsaturated fatty acids can be advantageous in its use as biodiesel.

**ORAMESI, IFEOMA** (Department of Biological Sciences, Fort Hays State University [isoraemesi@mail.fhsu.edu]), **Brian Maricle** (Department of Biological Sciences, Fort Hays State University [brmaricle@fhsu.edu]), **Arvin Cruz** (Department of Chemistry, Fort Hays State University [ajacruz2@fhsu.edu])

Presentation Type: Poster

Award: Master's graduate student

### IDENTIFICATION AND QUANTIFICATION OF IBUPROFEN IN BLOOD USING HPLC-UV/VIS

Non-steroidal anti-inflammatory drugs are some of the most frequently used medications in the United States. Ibuprofen is a common over-the-counter nonnarcotic analgesic, and it is also typically used as an antipyretic and as an anti-inflammatory. Intentional or unintentional ibuprofen overdose is common, but typically found to be non-life threatening. If a victim had decreased hepatic or renal function, however, ibuprofen overdoses may impart significant toxicity and at high dosages, it has been linked to cardiovascular events. Currently, the Sedgwick County Regional Forensic Science Center (RFSC) must send postmortem samples to a contract laboratory if ibuprofen toxicity is suspected. The purpose of this project was to develop and validate a method for the detection and quantitation of ibuprofen for RFSC using High Performance Liquid Chromatography

(HPLC) with a UV/Vis detector. Ibuprofen and an internal standard, o-toluic acid, were added to negative blood and extracted using acetate buffer (pH 4.5) and ethyl acetate/ hexane 50/50 at a range of concentrations (40 mg/L – 350 mg/L). Using the Breeze 2 software package, a calibration curve was generated and various test concentrations were quantitated. The method was validated in accordance with the Scientific Working Group for Forensic Toxicology (SWGTOX) guidelines. Actual concentrations (as measured by the Breeze 2 software) were within  $\pm 20\%$  of the expected concentrations. This method is a cost-effective option for rapid ibuprofen analysis.

**THIMMESCH, JANELLE** (The Master of Science in Forensic Science Program, the Departments of Biological Sciences and Physical Sciences Emporia State University [jthimmes@g.emporia.edu])

*Presentation Type: Poster*

*Award: Master's graduate student*

#### **SYNTHESIS AND PROPERTIES OF OXYGEN-BRIDGED TRIANGULENIUM DYES**

Synthetic routes to the novel 3a2-benzyl-1,5,9-trinitro-3a2H-4,8,12 trioxadibenzo [cd,mn]pyrene, tris-julolidine sesquianthrydrol, and tris-4,4''-(diphenylamino) sesquianthrydrol have been developed. Substituted triangulenium with oxygen bridges can stabilize carbocations by resonance. When three benzene rings are attached to a positively charged carbon, as in triphenylmethane, it is not possible for the three rings to maintain co-planarity because of steric interference between adjacent ortho hydrogens. The triangulenium compounds can be substituted reactions to replace hydrogens with other substituents because common electrophilic substitution reactions oxidize sesquianthene or sesquianthrydrol to the carbocation. Pyridine hydrochloride was used as a closure agent for the ring. Tris-julolidine sesquianthrydrol, and tris-4,4''-(diphenylamino) sesquianthrydrol were highly fluorescent. Also, we developed method of nitrating sesquianthene by using a benzyl protecting group.

**TRUMP, ERIC** (Department of Chemistry, Emporia State University [etrump@emporia.edu]), **Amri Nasser** (Department of Chemistry, Emporia State University [namri@g.emporia.edu])

*Presentation Type: Poster*

*Award: Not Competing*

### COMPUTER SCIENCE

#### **ASA H FORMS A CONCEPT OF SELF**

Our recently developed "Asa H" software architecture (KAS Transactions 109 (3/4): 159-167) consists of a hierarchical memory assembled out of clustering modules and feature detectors. Various experiments have been performed with Asa H 2.0 including real and simulated mobile robots. I have placed small aluminum foil tabs on various Lego bricks in my Lego NXT and EV3 robots. When the bricks pull sufficiently far apart the tabs lose electrical contact and this provides a pain signal to the Asa brain. While interacting with its environment Asa has learned concepts (vectors) like: approach=(sense far, move forward, sense near), collision=(sense near, bump, decelerate), grasp=(proximity sense, move hand, feel hand force), push=(move to, touch, feel contact force), kick=(ball near, push, ball far), lift=(arm motor, sense weight), carry=(grasp, lift, move), recharge=(low battery, detect dock, turn toward, approach, sense near, dock, decelerate), damage=(collision, pain), health=(battery charge, damage), sense=(sense far, sense near, sense weight, decelerate,...), act=(move, turn, grasp, release, kick, lift, lower, carry, approach, leave, push, pull, recharge), think=(sort file, load file, run simulation, search memory, case deduction, case extrapolation), self=(sense, think, act, health) along with many others. Names for categories can also be taught, for example: collision=(sense near, bump, decelerate, sound "collision"). The network fragment just presented constitutes Asa H's early concept of its self. I'm watching this concept as it grows. As David Hume said "self" is "...a bundle or collection of different perceptions which succeed each other..." (A Treatise on Human Nature)

**JONES, ROBERT** (Physical Science Department, Emporia State University [rjones@emporia.edu])

*Presentation Type: Poster*

*Award: Not Competing*

#### **AN IDENTIFICATION KEY TO THE TARDIGRADES OF KANSAS**

Identification of animals to species appears simple. For birds and mammals it is straightforward. It becomes more difficult with reptiles and fish and becomes exponentially more challenging with invertebrates. There are no field guide books for phyla such as Tardigrada. Students are stuck searching literature in obscure journals. The web has not filled this gap of information. To assist with this problem, a website has been developed to help identify tardigrades in Kansas. The website works by showing characteristics of tardigrades to the user. These choices come from a dichotomous key. The dichotomous key is provided by uploading two comma separated files (CSV) to the server. A series of questions is asked to the user. The user selects between two characteristics until a species is identified. The CSV's format is very specific and contains information such as line numbers for the next characteristic depending on the user selection. Also in the CSV, there is a previous line number which allows for changing prior selections and images. Creation of the website was driven to make the identification of species easier, faster, and more accurate for students in Baker University's NSF: Research Experience for Undergraduates. While the website was designed to be used to identify tardigrades it can be used to identify any species as long as the appropriate dichotomous keys are uploaded to the server. The program is currently available for use on the Baker University Computer Science server for the identification of tardigrades in Kansas.

**TENNANT, MICHELLE** (Department of Computer Science, Baker University [michellertennant@stu.bakeru.edu]), **William Miller** (Department of Biology and Chemistry, Baker University [william.miller@bakeru.edu]), **Robert Schukei** (Department of Computer Science, Baker University [robert.schukei@bakeru.edu])

*Presentation Type: Oral*

*Award: Undergraduate*

*TH 124—8:50*

### ECOLOGY/ORGANISMAL BIOLOGY

#### **SMALL SCALE RESTORATION OF THE STERNBERG NATURAL AREA: POTENTIAL INFLUENCES ON THE SMALL MAMMAL COMMUNITY**

Restoration of any area will potentially alter the diversity and relative abundance of numerous populations within that ecosystem. The Sternberg Natural Area is currently undergoing numerous restoration activities (e.g. tree removal, prescribed fire, and forb garden establishment) to increase the ecological integrity of the area and make it more appealing to the public. Our objective is to determine if these restoration activities will have an influence on the small mammal community. To determine these restoration activities have an effect on the small mammal community preliminary trapping data was collected. Preliminary trapping seasons (June, September, and November) consisted of four trap nights per season, with five transects

each consisting of twenty Sherman live traps spaced ten meters apart. Our trapping seasons resulted in the capture of five different species Hispid Cotton Rat (*Sigmodon hispidus*), White-footed Mouse (*Peromyscus leucopus*), Deer Mouse (*Peromyscus maniculatus*), Prairie Vole (*Microtus ochrogaster*), and Elliot's Short-tailed Shrew (*Blarina hylophaga*). The Hispid Cotton Rat was the most abundant in the area at making up 87.7% of the population while; the Prairie Vole was the least abundant making up 1.8% of the population. Because small mammals are a vital part of grassland ecosystems, influencing all trophic levels, alterations to the small mammal community may have profound effects on ecosystem functioning.

**BOROUGHGS, KALI** (Biological Sciences Department, Fort Hays State University [klboroughs@mail.fhsu.edu]), **Morgan Noland** (Biological Sciences Department, Fort Hays State University [manoland@fhsu.edu]), **Curtis Schmidt** (Biological Sciences Department, Fort Hays State University [cjschmidt@fhsu.edu]), **Mitchell Greer** (Biological Sciences Department, Fort Hays State University [mjgreer@fhsu.edu])

Presentation Type: Oral

Award: Undergraduate

TH 106 —11:10

#### HOST RANGE OF AN ENDOGENOUS STRAIN OF DAHLIA MOSAIC VIRUS IN MEMBERS OF ASTERACEAE

A newly discovered strain of *Dahlia* mosaic virus (DMV) called DMV-D10 was first observed in *Dahlia variabilis* in 2008. DMV-D10 does not induce visible symptoms of infection in the host plant, and is classified as an endogenous virus. These viruses have the ability to integrate their viral sequences into the host plant genome, which can be transmitted to offspring. No studies have examined the host range of DMV-D10. Because DMV-D10 has only been observed in *Dahlia*, the objective for this study was to determine if presence of DMV-D10 follows an evolutionary relationship among species closely related to *Dahlia*. It was hypothesized species in the same Asteraceae tribe (Coreoideae) as *Dahlia* were more likely to be infected with DMV-D10 compared to species in other Asteraceae tribes. Thirty-five species across ten Asteraceae tribes were collected, and DNA was extracted to determine DMV-D10 infection. DNA sequencing results of PCR products for a movement protein gene indicate DMV-D10 is widely spread across Asteraceae. Fragments of the DMV-D10 genome were present in thirteen species across seven tribes. Therefore, 37% of species in this study contained DMV-D10 viral sequences. Additionally, six species across five tribes contained *Dahlia* common mosaic virus viral sequences, and three species across two tribes contained *Dahlia* mosaic virus viral sequences. Therefore, phylogenetic relationship in host plants does not necessarily determine DMV-D10 infection. This leads to questions of how this virus can move to species in other Asteraceae tribes. Some potential hypotheses include pollen transmission, an unknown insect vector, or possible plant-virus coevolution.

**CAUDLE, KERI** (Department of Biological Sciences, Fort Hays State University [klcaudle@mail.fhsu.edu]), **Eric Gillock** (Department of Biological Sciences, Fort Hays State University [egillock@fhsu.edu])

Presentation Type: Oral

Award: Master's graduate student

TH 106 —8:10

#### DEER EFFECTS ON CROSS TIMBERS OAK WOODLAND REGENERATION IN LARGE VS. SMALL CANOPY GAPS

Large deer populations have been hypothesized to negatively impact forest and woodland regeneration through intensive browsing of saplings. In Kansas, the highest whitetail deer (*Odocoileus virginianus*) densities are in the eastern one-third of the state. To address the possible negative effect of deer browsing on oak regeneration in a Chautauqua Hills woodland, we are comparing growth of browse-accessible and browse-excluded post oak (*Quercus stellata*) saplings that occur in varying sizes of gaps in the woodland canopy. Here we address whether 1) deer browsing reduces growth and survival of oak saplings, 2) canopy gap size affects sapling growth and survival, and 3) effects of deer browsing differ in large vs. small gaps. Large gaps were those  $\geq 154 \text{ m}^2$  and small gaps were  $< 154 \text{ m}^2$ . In March, June and September 2016 we quantified frequency of browsing, height and an estimate of aboveground biomass of saplings that were either accessible to deer or protected from deer and occurred in either large or small canopy gaps. Initial analyses after one growing season of data show low rates of browsing on experimental saplings during 2016 and no effects of either deer presence or gap size on sapling growth and survival.

**CORY, BEVERLY** (Department of Biology, Wichita State University [bjcory@shockers.wichita.edu])

Presentation Type: Oral

Award: Master's graduate student

TH 106 —9:30

#### INVESTIGATING FLORAL DIVERSITY OF WESTERN KANSAS GRASSLANDS TO ASSESS POLLINATOR PRODUCTIVITY

Evolution of the specialized relationships between plants and pollinators has influenced the ecological productivity of ecosystems across the world; therefore, increasing global biodiversity. As with many biological interactions, the threat of climate change and anthropogenic stresses has increased awareness to study these relationships in nature. Drought, invasive species establishment, and transformation of native grasslands to agriculture are among the stresses exerted on plants and pollinators in Kansas. Even so, little attention has been given to assessing flora diversity in relation to pollinators in the state of Kansas. Therefore, the objective of this study was to assess the floral diversity of two native grassland sites in western Kansas, and relate findings to pollinator productivity. Two grassland sites were visited seven periods during peak blooming season from June through September 2016. Sixteen transects were randomly selected per site, and canopy coverage for each flowering species (i.e., herbaceous species excluding grasses) was calculated. Plant species with purple and white flowers had some of the highest canopy coverage at both grassland sites. Resinous skullcap (*Scutellaria resinosa*), sessile-leaf tickclover (*Desmodium sessilifolium*), and narrow leaf-blueets (*Hedyotis nigricans*) were among the most abundant plant species, which are known to be selected by pollinators. Therefore, the Kansas grassland sites in this study appeared to be suitable sources in sustaining pollinators. Results from this study can be used to shape future studies on pollinators and plant diversity. In summer 2017, we hope to expand on these findings by incorporating experiments to determine which plant species are preferred by honeybees.

**ENGEL, RYAN** (Department of Biological Sciences, Fort Hays State University [rpengel@mail.fhsu.edu]), **Keri Caudle** (Department of Biological Sciences, Fort Hays State University [klcaudle@mail.fhsu.edu])

Presentation Type: Poster

Award: Undergraduate

#### CRITICAL HABITAT ASSESSMENT OF THE STATE THREATENED BROAD-HEADED SKINK

The Broad-Headed Skink (*Plestiodon laticeps*) is a semi-arboreal species that inhabits deciduous forests of the southeastern United States. Eastern Kansas makes up the northwestern periphery of their range and thus serves as an important area for studying the conservation of the species. In order to better evaluate the conservation status of the Broad-Headed Skink and develop a Recovery Plan, critical habitat needs to be better defined. In 2016, we surveyed 117 sites at Marais des Cygnes Wildlife Area, Marais des Cygnes National Wildlife Refuge, and La Cygne Wildlife Area. We installed drift fences, performed visual encounter surveys, and conducted a habitat evaluation at each site. A total of 560 individuals were collected that represented 32 species and 39 Broad-Headed Skinks were observed. Critical habitat variables were assessed using a logistic

regression.

**HULLINGER, ALLISON** (Department of Biological Sciences, Fort Hays State University [arhullinger@mail.fhsu.edu]), **Zackary Cordes** (Ecological Services Section, Kansas Department of Wildlife, Parks, and Tourism [zackary.cordes@ks.gov]), **Daren Riedle** (Ecological Services Section, Kansas Department of Wildlife, Parks, and Tourism [daren.riedle@ks.gov]), **William Stark** (Department of Biological Sciences, Fort Hays State University [wstark@fhsu.edu])  
Presentation Type: Oral Award: Master's graduate student TH 106 —8:30

#### **THE BIRD'S BIGGEST FAN: WIND TURBINE EFFECTS ON BREEDING BIRD HABITAT SELECTION**

As America continues through the 21st century, energy production persists as one of the major challenges placed on society. This has resulted in large-scale implementation of wind energy facilities. Federal Aviation Administration data show that over 34,000 turbines were constructed across the continental United States from 2005-2015 with an additional 16,000 proposed tower permits as of February 2017. Because of the urgency behind wind energy development and the speed of wind farm implementation, most wildlife impact studies have only addressed concerns after installation at local scales. Studies that look at true responses from grassland birds to wind turbine installations on a site have not been completed. The solution for this problem is to turn to the North American Breeding Bird Survey (BBS) as a large-scale, long-term monitoring program to adequately match "before—after" analysis to these "control—impact" studies. This study will assess the long term effects of wind energy facilities on breeding birds by using match-paired analysis of select BBS survey routes to determine if trends in species population abundance significantly respond to turbine installation compared to population trends on control sites. Historic land use data will then be collected to document other potential landscape scale changes along the selected survey routes to see if other factors have a greater or additive effect on breeding birds than wind energy facilities.

**Kyle Schumacher** (Department of Biological Sciences, Fort Hays State University, Hays, Kansas [kwschumacher@mail.fhsu.edu]), **GREER, MITCHELL** (Department of Biological Sciences, Fort Hays State University, Hays, Kansas [mjgreer@fhsu.edu])  
Presentation Type: Poster Award: Not Competing

#### **TARDIGRADES OF THE CANOPY: POTENTIAL FOR AVIAN-MEDIATED LONG DISTANCE DISPERSAL IN AMERICAN TARDIGRADES**

Tardigrades are a globally distributed phylum of microscopic aquatic invertebrates famous for cryptobiosis and space travel but little is known about their actual methods of dispersal. Wind is assumed but not truly demonstrated and some tardigrade distribution patterns cannot be explained by prevailing winds. Animals such as mammals and birds have been proposed as potential vectors. The role of birds is explored in this report by examining bird nests and feathers for the presence of tardigrades. In this preliminary study of 10 bird nests, 70% yielded 74 tardigrades from two classes, three orders, eight genera and ten species, suggesting many bird nests are constructed of tardigrade suitable habitat providing a high probability of opportunity for tardigrades to transfer to birds for passive transport. The few feathers examined so far have been negative for evidence of tardigrades.

**Matthew J. Mogle** (Department of Biology & Chemistry, Baker University [William.Miller@BakerU.edu]), **KIMBALL, SCOTT A.** (Department of Biology & Chemistry, Baker University [William.Miller@BakerU.edu]), **William R. Miller** (Department of Biology & Chemistry, Baker University [William.Miller@BakerU.edu])  
Presentation Type: Poster Award: Not Competing

#### **INSECT FORAGERS ON TALL THISTLE, *CIRSIIUM ALTISSIMUM* (L.) SPRENG., AND LATE BONESET, *EUPATORIUM SEROTINUM* MICHX., IN CHEROKEE COUNTY, KANSAS**

Tall Thistle, *Cirsium altissimum* (L.) Spreng., and late boneset, *Eupatorium serotinum* Michx. (Asteraceae) are native plant species which may be found in bloom from August into late September or October in southeast Kansas. In fall semester, 2014, three sites in Cherokee County, Kansas, were used to observe and collect foragers on tall thistle plants located amidst populations of boneset. Pollen washes of foragers were made with ethanol and then stained with Calberla's fluid to study pollen load compositions as part of an ongoing study of forager guilds and annual changes in their relative oligolectic or polylectic foraging. From September 05 to September 23, 2014, a total of 30 bees (*Bombus* and *Melissodes*, Apidae), on tall thistle, were collected and washed. As tall thistle blooming phenology ended by September 25th, boneset blooming phenology began and continued until October 21, 2014. Bumblebee foraging was not observed on boneset but forager diversity increased over that observed on tall thistle. Whereas bumblebees visited tall thistle, insect visitor diversity on boneset included several species mostly in Orders Hymenoptera, Coleoptera, and Mecoptera.

**KING, ADAM** (Department of Biology, Pittsburg State University [hnonnenmacher@pittstate.edu]), **Trevor Burrows** (Department of Biology, Pittsburg State University [hnonnenmacher@pittstate.edu]), **Hermann Nonnenmacher** (Department of Biology, Pittsburg State University [hnonnenmacher@pittstate.edu])  
Presentation Type: Poster Award: Not Competing

#### **RESPONSES BY ATLANTIC GHOST CRAB (*OCYPODE QUADRATA*) POPULATIONS TO NATURAL AND ANTHROPOGENIC DISTURBANCES ON A TEXAS BEACH: A 10-YEAR STUDY**

The Atlantic Ghost Crab (*Ocyropsis quadrata*) is a widely distributed predator and scavenger along Atlantic Ocean and Gulf Coast beaches, and populations face both natural and anthropogenic threats. A long-term study begun in 2006 on the Texas Gulf Coast assessed the impact of human activity on Ghost Crabs. Line transects were used to determine beach width at a high-impact site and a low-impact site. Variables included the number of active burrows per transect, burrow density, the diameter of burrow openings, burrow distance to the high-water line, and nearest-neighbor distances. Differences were found between the two sites in all measures. In Fall 2008, Hurricane Ike leveled sand dunes along the Bolivar Peninsula study site and caused heavy beach erosion. Re-examinations of the original study sites in 2010 showed that Ghost Crab populations at both sites showed significant changes in the number and density of burrows and that mean burrow diameter had decreased. The high-impact site experienced a significant decline in human activity immediately after the storm. Mean beach width increased by > 50%, the number of burrows/transect tripled, and nearest-neighbor distances decreased by one-third. The hurricane also reshaped the Western tip of the peninsula. Mean beach width decreased at the low-impact site by two-thirds, burrow density increased by sevenfold, and nearest-neighbor distances decreased by one-half. Sampling at these same sites in 2012, 2014, and 2016 show that some of the physical characteristics of the beach gradually have returned to near pre-hurricane status. However, several population parameters still differ significantly as hurricane impacts have had lasting effects on both human and crab populations.

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**POPULATION DYNAMICS OF THE COMANCHE HARVESTER ANTS (*POGONOMYRMEX COMANCHE*) IN KANSAS**

While most harvester ant species are found in xeric locations of Western North America, the Comanche harvester (*Pogonomyrmex comanche*) is at home in cooler, more temperate locations where vegetation cover is heavier, as long as soil conditions are appropriately sandy. The Arkansas River valley of south-central Kansas provides appropriate conditions along portions of its length. Harvester ant mounds in one such location were marked and studied for one full growing season, from April to November of 2016. The general behavior of the ants and the specific patterns of colony relocation were recorded and analyzed. Food availability - mostly seeds but also other insects - was high in this habitat, but whole colony movements occurred with some frequency. It is hypothesized here that wet conditions caused by frequent rainfall forced the relocations in what is a trade-off forced upon the ants by their habitat location.

**MATHEWS, PATRICK** (Department of Biology, Friends University, Wichita [mathews@friends.edu])

Presentation Type: Oral

Award: Not Competing

TH 106 —1:50

**WHITE-TAILED DEER HERBIVORY PREFERENCE OF TREE SAPPLINGS IN THE RIPARIAN ZONES OF KONZA PRAIRIE**

White-tailed deer (*Odocoileus virginianus*) populations throughout the Midwestern United States exceed historical levels. Extensive deer browsing may be a concern in Kansas as it has altered tree species composition in forests of eastern North America. The objectives for this study are to determine browsing preference of white-tailed deer among tree saplings within Kansas Flint Hills riparian woodlands and to quantify variation in browsing intensity in relation to distance to the woodland edge. Hypotheses include H1: White-tailed deer prefer to browse oak species, e.g. burr oak (*Quercus macrocarpa*) and Chinquapin Oak (*Quercus muehlenbergii*), over other present species, H2: Browsing in the riparian zones mostly occurs closer to the grassland edge and H3: Browse is more intense <3m from established deer trails than >3m from trails. Data was collected along transects extending from the stream to the woodland-grassland edge. Preference was established by identifying tree saplings and quantifying to what extent they have been browsed. We quantified distance of plot to grassland, tree species composition within plots, and proximity to established deer trails. Findings reject the hypothesis that oak species are preferred over other tree species. Browse evidence indicates a preference for bitter-nut hickory (*Carya cordiformis*). Browsing intensity did not change with proximity to grassland. Browsing was more intense <3m from deer trails than >3m from trails. This research takes a step toward understanding the browse preferences and behavior of deer at Konza Prairie and provides a more complete view on the impact deer have on riparian plant communities and their biodiversity.

**MCLINN, KORY** (Department of Biological Sciences, Wichita State University [kory.mclinn@gmail.com]), **Leland Russell** (Department of Biological Sciences, Wichita State University [leland.russell@wichita.edu])

Presentation Type: Poster

Award: Undergraduate

**TRACKING WESTERN MASSASAUGA IN A LARGE INTERIOR WETLAND**

Radio-telemetry allows for specific individuals to be located on a consistent basis. This is especially useful with secretive animals such as snakes. We investigated the spatial ecology of the Western Massasauga (*Sistrurus tergeminus*) at Cheyenne Bottoms in Barton County, Kansas. Five individuals were surgically implanted with VHF transmitters during 2016. These individuals were tracked twice weekly from July to the end of October, and then once weekly from November until activity ceased. This study is ongoing, with additional transmitters to be deployed in 2017 and will provide information valuable to the management and conservation of this species.

**MEAD, JOSHUA** (Department of Biological Sciences, Fort Hays State University [jjmead@mail.fhsu.edu]), **William Stark** (Department of Biological Sciences, Fort Hays State University [wstark@fhsu.edu])

Presentation Type: Oral

Award: Master's graduate student

TH 106 —8:50

**TARDIGRADES OF THE CANOPY: ANOTHER NEW SPECIES OF THE GENUS *MILNESIUM* FROM KANSAS**

The tardigrade genus *Milnesium* was described in 1840, based on the sloping body, six peribuccal papilla and lamellae, a wide buccal tube, a lack of placoids and the separated double claws. For 155 years this large, easily recognized, limno-terrestrial water bear genus was considered monotypic and cosmopolitan. During that time, only 2 varieties were proposed. Since 1990, 33 new species have been described based on differences in cuticular granulation, the number of peribuccal lamellae, the size, and shape of the claws, and variation in dimensions in buccal tube width and stylet support attachment relative to buccal tube length. Recently, the nominal species was brought to modern taxonomic standards and defined the suite of characteristics necessary to differentiate the species within the genus. The genus was divided into two groups, one with smooth cuticles and the other with a granulated dorso-lateral cuticle. The group concept is further expanded to divide the genus by the number of peribuccal lamellae (4 or 6) and the pattern of points or sub-branches found on the secondary claw branch of each leg. With one species having already been found by Baker's Research Experience for Undergraduate students, we are able to describe another new species of *Milnesium* from the canopy of Kansas. This unique tardigrade is characterized by its smooth cuticle, six peribuccal lamellae, long primary branch of the claws with accessory points, a claw configuration of [3-3]-[3-3] and a buccal tube that is significantly shorter than other species.

**Sadie Schlabach** (Ithaca College, REU at Baker University [William.Miller@BakerU.edu]), **Emalee Donaldson** (Iowa State University, REU at Baker University [William.Miller@BakerU.edu]), **Jasmin Camba** (Hartnell College, REU at Baker University [William.Miller@BakerU.edu]), **MILLER, WILLIAM R.** (Biology, Baker University [William.Miller@BakerU.edu]), Margret D. Lowman (California Academy of Science [William.Miller@BakerU.edu])

Presentation Type: Oral

Award: Not Competing

TH 124 —8:10

**DISCOVERY OF NOVEL BACTERIA SHOWING ANTIMICROBIAL CHARACTERISTICS AGAINST E.S.K.A.P.E PATHOGEN RELATIVES**

In recent years, the Center for Disease Control and Prevention has highlighted a faction of antibiotic-resistant bacteria, acronymically dubbed "the ESKAPE pathogens" (*Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa* and *Enterobacter* spp.), capable of 'escaping' the biocidal action of antibiotics and mutually representing new paradigms in pathogenesis, transmission and resistance. (Gilmore et al., 2014) The increases of antibiotic resistance have far-reaching effects on today's global health. Thus, scientists are looking for solutions to the problem. This research looks at soil samples collected from different locations around Hays, KS in search of bacteria that potentially produce antimicrobial characteristics. Thirty isolates from each sample were tested against six different relatives of the E.S.K.A.P.E. pathogens. Six isolates revealed the capacity to successfully combat growth of the ESKAPE relative. The streak plate technique was performed to ensure the purity of each sample. Subsequently, each pure culture was stained; and some

biochemical tests were performed. The 16s rRNA gene of each culture was isolated. The results were purified and then sent to Yale University for DNA sequencing. Results are pending.

**MONTGOMERY, SAMI** (Department of Biology, Fort Hays State University [samimontgomery22@gmail.com]), **ZIMMERMAN, WENDY** (Department of Biology, Fort Hays State University [wmzimmerman@mail.fhsu.edu]), **CARVALHO, TAISSA** (Department of Psychology, Fort Hays State University [ttdasilvacarvalho@mail.fhsu.edu])  
Presentation Type: Poster Award: Undergraduate

#### **DETERMINING THE EFFECTS OF COMPOSTABLE PACKING PEANUTS ON BIOMASS PRODUCTION OF A COMMON CROP SPECIES**

As consumers choose to do more of their shopping online there will continue to be an increasing market for shipping and packing supplies, including packing peanuts. Many companies advertise using biodegradable or compostable materials to make these peanuts. Since there is an intrinsic link between plants and the soil they grow in. Anything present in the soil could potentially influence the growth of a plant growing in that soil. Given the claims of the packing supply companies and the link between soil and plant growth we investigated the effects of addition of whole packing peanuts and packing peanuts dissolved in water on aboveground, belowground, and total plant biomass production of winter wheat. We conducted our experiment in the Fort Hays State University greenhouse using a randomized block design with twelve replicates. Our treatments consisted of adding a single layer of 15 packing peanuts to the soil surface (peanut) at experiment initiation or a solution of 30 peanuts dissolved in 1000ml of deionized water (solution) once a week for 12 weeks. Plants that received only water acted as our control (control). The data shows that the control treatment produced the greatest amount of biomass for aboveground, belowground, and total plant biomass yields. The solution treatment had the lowest aboveground and total plant biomass while the peanut treatment had the lowest belowground biomass. Our results indicate that addition of compostable packing peanuts either directly or as a solution may lower biomass production in some plant species.

**PARKINSON, ELAINE** (Kansas Academy of Math and Science, Fort Hays State University [e\_parkinson@mail.fhsu.edu])  
Presentation Type: Poster Award: Undergraduate

#### **POSSIBLE RELATIONSHIP BETWEEN VOCAL COMMUNICATION SYSTEM AND FAT RESERVE IN WINTERING BIRDS: A TEST OF THE OPTIMAL BODY MASS THEORY**

Fat reserve is a key adaptation in wintering small birds with regard to maximizing individual fitness in a variable environment. Optimal body mass models in birds suggest that high winter fat reserves maximize winter survival by balancing costs and benefits of fat deposition. Costs of a high fat reserve include increased wing loading, reduced ability to avoid predators, and increased predator-exposure while feeding. The major benefit of high fat reserve is increased survival during the absence of resources. Flock integration may play an important role in determining the fat reserves of birds. I tested the hypothesis that if bird species has a high vocal repertoire, then individuals will have a high flock integration. High flock integration leads to high communication efficiency, which reduces predation risk. I record the vocalizations (diversity, rate per bird) of the Dark-eyed Juncos (*Junco hyemalis*) and American Tree Sparrows (*Spizella arborea*) in South-central Kansas. Juncos are typically fatter in winter than tree sparrows and therefore were predicted to have a larger winter vocal repertoire within its winter flocks than the tree sparrow. A Marantz digital recorder with a Sennheiser directional microphone was used to record vocalizations at winter feeding stations. Raven software was used to describe different vocalizations for each species. Consistent with the hypothesis, tree sparrows produced only 1 call type per 30-min observation period, whereas dark-eyed juncos produced 2-4 call types. Preliminary results also suggest greater overall vocalization in juncos than in tree sparrows.

**PERERA, NUWANTHIKA** (Department of Biological Sciences [dxgamage@shockers.wichita.edu])  
Presentation Type: Oral Award: Master's graduate student

TH 106 —9:10

#### **VIGILANCE PATTERNS OF BLACK-TAILED PRAIRIE DOGS (*CYNOMYS LUDOVICIANUS*) IN URBAN AND RURAL COLONIES**

In this study, we analyzed the relationship between landscape context and the vigilance and foraging patterns of the black-tailed prairie dog (*Cynomys ludovicianus*). We studied four colonies, two in urban settings and two in rural settings, in March - May of 2016 and August - September 2016. We measured vigilance in colonies by observing individuals for five minutes and recording the amount of time the individual spent vigilant or foraging. In addition, the total number of individuals in the colony that were actively vigilant or foraging were counted every ten minutes for one hour. Rural colonies were more vigilant than urban colonies, and displayed a lower proportion of individuals foraging in both the spring and summer. Because prairie dogs in urban colonies are habituated to disturbance and are assumed to have a very low risk of predation, they spent much less time vigilant individually. Urban colonies also had a higher proportion of individuals foraging within the colony. This data could be used in further understanding the impact that encroaching urban development has on black-tailed prairie dogs, as well as analyzing the reason behind the occurrence of higher population densities of prairie dogs in urban areas.

**PITSCHMANN, JUSTIN** (Department of Biology, Sterling College [justinpitschmann@gmail.com]), **Jonathan Conard** (Department of Biology, Sterling College [jconard@sterling.edu])  
Presentation Type: Oral Award: Not Competing

TH 106 —2:30

#### **HERBIVORY PREFERENCES AMONG ECOTYPES OF BIG BLUESTEM (*ANDROPOGON GERARDII*)**

Big bluestem (*Andropogon gerardii*), a dominant prairie grass, exhibits a wide distribution with several genetically distinct ecotypes. Each ecotype uniquely adapts to abiotic and biotic factors within its own environment. These adaptations may prove more or less desirable to herbivores in the area. For instance, plants adapted to areas with greater rainfall tend to grow larger than those adapted to drier conditions. However, wetter conditions might result in greater numbers of herbivores, so ecotypes adapted to wetter conditions might have evolved greater herbivore defense mechanisms; therefore, a trade-off may exist between drought resistance and herbivore resistance. We hypothesized that herbivores would display a preference for plants adapted to drier conditions. We tested this with feeding preference trials involving grasshoppers and leaves from five ecotypes of *A. gerardii* that represented plants adapted to wet and dry conditions. Scans of leaves before and after herbivory trials indicated 53 to 77 percent of leaf area remained, with the more mesic ecotypes being favored by herbivores. We also hypothesized that leaves with more tannins would be less preferable to herbivores. This was tested with measures of leaf tannin concentration from five ecotypes of *A. gerardii* from four common gardens across a precipitation gradient. Leaf tannin concentrations ranged from 0.19 to 3.93% of leaf dry mass, and were not different among ecotypes. However, there were site differences among leaves, indicating environmental influences on leaf tannin concentration. Ecotypes of *A. gerardii* are responsive to environmental factors involving herbivory, but were not related to leaf tannin concentrations.

**PITTENGER, MADISON** (Department of Biological Sciences, Fort Hays State University [mspittenger@mail.fhsu.edu]), **Keri**

**Caudle** (Department of Biological Sciences, Fort Hays State University [klcaudle@mail.fhsu.edu]), **Sara Baer** (Department of Plant Biology and Center for Ecology, Southern Illinois University [sgbaer@siu.edu]), **Loretta Johnson** (Division of Biology, Kansas State University [johnson@ksu.edu]), **Brian Maricle** (Department of Biological Sciences, Fort Hays State University [brmaricle@fhsu.edu])

Presentation Type: Poster

Award: Undergraduate

#### **PATTERNS OF PREDATION ON BIVALVE MOLLUSKS ALONG THE TEXAS GULF COAST**

Predation on bivalves is common amongst the bays of the United States; however, few studies exist describing the feeding patterns of bivalve predators and whether or not they exhibit prey selection. In 2016, prey species of the Southern Oyster Drill, *Stramonita haemastoma*, and possibly the Moon Snail, *Neverita duplicata*, were obtained from three collection sites along the Gulf Coast on the Bolivar Peninsula, TX. The collected shells were identified by species and several measurements were taken to examine statistical relationships among prey species. These measurements included drill hole diameter, prey shell thickness, drill hole completeness, and collection site. Among the three locations, 15 prey species were identified and all showed high variation in drill hole diameter, shell thickness, and drill hole completeness. For example, both the number of holes and drill hole diameter differed significantly among the prey species (ANOVA, both  $P < 0.0001$ ). In addition, drill hole diameter correlated positively with prey shell thickness ( $P < 0.0001$ ), and shells whose drill holes were complete were significantly thinner than those with partially drilled holes ( $P < 0.0001$ ). Prey species also displayed high variation based on the collection site. For instance, mean prey shell thickness, mean drill hole diameter, and the mean number of drill holes all differed significantly by collection site (all  $P < 0.0001$ ). We will discuss ecological and morphological implications related to predation on bivalves.

**RANDOLPH, SERENA** (Field Biology Program, Friends University, 2100 University, Wichita KS 67213 [serena\_randolph@student.friends.edu])

Presentation Type: Oral

Award: Undergraduate

TH 106 —2:10

#### **IDENTIFYING HABITAT STRUCTURE OF HERPETOFAUNAL COMMUNITIES WITH UAS TECHNOLOGY**

The primary means of conducting habitat assessments and landscape monitoring are currently performed by ground surveys. However, these methods can be difficult to conduct in remote areas, and are temporally and financially expensive. Aerial photographs overcome some of these issues, but there are several problems associated with poor resolution and are produced at too low of frequency for proper analysis and monitoring. Unmanned aircraft systems (UAS) and high resolution sensors can improve monitoring efforts of landscapes, which can be obtained at high frequencies with high image resolution. Texas horned lizards (*P. cornutum*) and Lesser earless lizards (*H. maculata*) are ideal organisms to study habitat composition within a landscape due to their low mobility and specific habitat niche. The objective of this study is to monitor herpetofauna communities within western Kansas, and gather data using UAS technology to characterize presence patterns and microhabitat structure.

**ROGERS, SEAN** (Department of Biology, Fort Hays State University [scrogers3@mail.fhsu.edu])

Presentation Type: Poster

Award: Master's graduate student

#### **THE CORRELATION BETWEEN AGE AND SEQUENTIAL ORDER OF GIRAFFA RETICULATA**

In accredited zoo facilities housing herd animals, like the species *Giraffa reticulata*, there is a time when animals are prepped for movement—this could be to a new area within the barn or outdoors. Regardless, this shifting process at times takes too long. The process for some individuals is much shorter while for others the process becomes energetically exhausting. This study focuses on the correlation between age and shifting order for captive giraffes that has never been addressed within the field. There has been no research presented on such a topic. The purpose of this study is to aid in smoothing the shifting process for zookeepers and animals by seeking to understand the reason behind how they migrate to the new area. This observational research was gathered at Omaha's Henry Doorly Zoo and Aquarium. Data consisted of an a.m. and p.m. shifting order for 60 days. Each day, the data was recorded in the order the reticulated giraffes shifted into their outside enclosure, along with shifting indoors for nighttime hours. Spearman correlations for each shifting period were performed along with a summary provided by a 1-sample T-test displaying values for every given month will be statistically performed. Results on certain days showed a correlation linking age and order but other days there was not a correlation amongst the two. Environmental factors, noise, and reward tended to play a part in the overall result of the animals shifting and could potentially be a main theme focused on throughout the study.

**SCHUCK, BRIANNA** (Department of Biology Fort Hays State University [blschuck@mail.fhsu.edu])

Presentation Type: Oral

Award: Undergraduate

TH 106 —11:30

#### **FLORISTIC SURVEY DOCUMENTS 100 RECORDS FOR OTTAWA COUNTY, AND 5 STATE RECORDS FOR OKLAHOMA**

Recent contractual work for a floristic survey of vascular plants on some parcels of land along or near to the Neosho River west of Miami, Oklahoma, was completed. The agreement, between faculty and students associated with the T. M. Sperry Herbarium at Pittsburg State University and the Grand River Dam Authority, included the growing seasons of 2015 and 2016. A total of 937 specimens were obtained from 28 collecting trips, representing 460 unique taxa in 80 families, 254 genera, 450 species, and 10 non-nominal infraspecific taxa. Noteworthy is that although the land area encompassed only 1021.5 hectares, a total of 100 first occurrences were noted for Ottawa County, and 5 state records were documented for Oklahoma (*Arenaria serpyllifolia* var. *tenuior*, *Carex sparganioides*, *Cerastium semidecadrum*, *Crataegus phaneropyrum*, *Trifolium aureum*). Taxa non-native to North America included 16.9% of the total. The surprisingly high number of county level records, and five state records, suggests that additional floristic surveys are needed, particularly in rural areas distant from active herbaria. Modern distributional data of plants is of immediate use to land use planners and of value to ecologists. Current data are desirable, given that some areas (e.g., Cherokee County, Kansas (adjacent to Ottawa Co, OK) have never had county-wide surveys, or those that have, such as Crawford County (north of Cherokee Co, KS), were done over fifty years ago.

**SNOW, NEIL** (Department of Biology, Pittsburg State University [nsnow@pittstate.edu]), **Samantha Young** (Department of Biology, Pittsburg State University [syoun@pittstate.edu]), **Chance Curran** (Department of Biology, Pittsburg State University [kskid34@yahoo.com]), **John Kartesz** (Biota of North America Program (BONAP) [john.kartesz@yahoo.com])

Presentation Type: Poster

Award: Not Competing

#### **PRELIMINARY ANALYSIS OF A SURVEY OF CHYTRID IN KANSAS**

Amphibians are one of the most threatened groups of organisms worldwide, per the International Union for Conservation of Nature. Habitat destruction, degradation, and fragmentation pose a threat to populations. However, the decline in protected areas may be due to climate change and the emergence of novel diseases such as *Ranavirus* and *Chytridiomycosis*. *Chytridiomycosis* has been linked to population declines worldwide, including the extinction of multiple species in Central America

and Australia. Incidence of the fungus has been reported in Colorado, Oklahoma, Nebraska and recently at three locations in south-central Kansas. The objective of our study was to assess the status of chytrid throughout the state of Kansas. In 2015-2016 we conducted surveys at multiple locations. We used real-time PCR to analyze swabs collected at each location. Preliminary results show chytrid present at 4 locations in Kansas. We will continue to analyze samples to determine aspects of life history that might increase the potential for infection.

**SNYDER, ARIEL** (Department of Biological Sciences, Fort Hays State University [a\_snyder2@mail.fhsu.edu]), **William Stark** (Department of Biological Sciences, Fort Hays State University [wstark@fhsu.edu]), **Daren Riedle** (Ecological Services Section, Kansas Department of Wildlife, Parks & Tourism [daren.riedle@ks.gov])  
Presentation Type: Poster Award: Master's graduate student

#### VARIATION IN THE FLIGHT MORPHOLOGY OF THE CLIFF SWALLOW

A species' response to habitat modification may include anatomical, physiological, and behavioral adaptations. Without adequate response, many species face population decline and even extinction. The Cliff Swallow (*Petrochelidon pyrrhonota*) has modified its behavior to utilize human-made structures as nesting sites. These sites frequently include overpasses or bridges, which increases the frequency of avian-vehicle collision. Recent research in a county in western Nebraska suggests there may be strong selective pressure on the flight morphology of Cliff Swallow populations closely associated with roadways, with these populations exhibiting a negative trend in wing chord over a 30-year sampling period. Our study sought to determine if there were similar trends in Cliff Swallow wing chord and tail length – measured as a secondary morphological characteristic – in an expanded geographic and temporal range. Specimens collected in 24 states with collection dates between 1871 and 2014 were borrowed from six museums and measured. Results indicate wing chord significantly increases due to increased elevation, increased latitude, and decreased temperature, but does not vary significantly over time or due to precipitation. Tail length significantly increases with increased elevation, increased latitude, and decreased precipitation, but does not vary significantly over time or due to temperature. It appears that there has not been widespread change in Cliff Swallow flight morphology over the past 140 years, and selective pressures on flight morphology seem to vary significantly across their geographic range.

**STEFFEN, DYLAN** (Department of Biological Sciences, Fort Hays State University [djsteffen2@mail.fhsu.edu]), **Jeffrey Carter** (Department of Biological Sciences, Fort Hays State University [jjcarter2@fhsu.edu])  
Presentation Type: Oral Award: Undergraduate TH 106 –10:30

#### GENETIC AND ENVIRONMENTAL INFLUENCES ON STOMATES OF BIG BLUESTEM (*ANDROPOGON GERARDII*) ECOTYPES

Big bluestem (*Andropogon gerardii*) is a dominant prairie grass that has wide distribution and numerous genetically distinct ecotypes within the species. Many of the ecotypic adaptations of big bluestem are related to water availability in the native environment. Epidermal pores on leaves, called stomates, facilitate photosynthetic gas exchange and regulate water loss from the plant. As such, stomatal size and density represent possible adaptations to conserve water. We hypothesized drought-tolerant ecotypes of big bluestem would have fewer or smaller stomates compared to more mesic ecotypes. Five ecotypes of big bluestem were planted in four common gardens from western Kansas to southern Illinois to determine genetic and environmental influences on stomates. We made epidermal imprints to measure stomatal size and density on tops and bottoms of leaves. Leaves were largely hypostomatous, with genetics being a much more prominent influence than environment. The drought-tolerant Sand Bluestem had larger stomates on the bottoms of leaves, but a lower density compared to most other ecotypes. The most mesic ecotype from Illinois and the Kaw cultivar had the greatest density of stomates on the bottoms of leaves. Sand Bluestem had a greater density of stomates on the tops of leaves compared to all other ecotypes. There was no difference in size or density of stomates among sites, despite mean annual precipitation ranging from 505 to 1167 mm, illustrating the genetic underpinnings of stomates in big bluestem. There is a genetic predisposition for drought-tolerant ecotypes to have fewer stomates, illustrating an evolutionary adaptation to drought tolerance in an important prairie species.

**VARVEL, NICK** (Fort Hays State University, Department of Biological Sciences, 600 Park St., Hays, Kansas, 67601, USA [navarvel@mail.fhsu.edu]), **Christina Hilt** (Fort Hays State University, Department of Biological Sciences, 600 Park St., Hays, Kansas, 67601, United States [cjhilt@mail.fhsu.edu]), **Sara Baer** (Southern Illinois University, Department of Plant Biology and Center for Ecology, Carbondale, IL, 62901, USA [sgbaer@siu.edu]), **Loretta Johnson** (Kansas State University, Biology, Ackert Hall Rm 232, Manhattan, KS, 66506-4901, USA [johnson@ksu.edu]), **Brian Maricle** (Fort Hays State University, Department Of Biological Sciences, 600 Park St., Hays, KS, 67601-4099, USA [brmaricle@fhsu.edu])  
Presentation Type: Oral Award: Undergraduate TH 106 –10:50

#### SEX-DEPENDENT DIFFERENTIAL INVESTMENTS INTO COSTLY LEG REGENERATION IN WOLF SPIDERS

Leg autotomy is a common adaptive response by arthropods to a variety of situations. The loss of function costs associated with leg loss favors the ability to subsequently regenerate legs, which has its own associated costs. Investment into leg regeneration is energetically costly and it takes several molts to fully regenerate legs, leaving legs in the middle of process of regeneration shorter, misshaped, and discolored. Because of the energetic costs, any difference in leg function could lead to tradeoffs in regeneration investment. In spiders, legs are used in locomotion and prey capture by both sexes, while in males, the forelimbs are also used in courtship to attract a mate. In order to examine the costly nature of limb regeneration and differential investment by the sexes, we intentionally autotomized front and hind legs of the wolf spider, *Rabidosa punctulata* and reared them on diets that differed in the amount of food. Upon maturation, we found that the degree of leg regeneration was dependent on the spider's diet. Interestingly, we found that the sexes invest differently into leg regeneration. Males tend to invest more into regenerating their forelegs, while females tended to invest equally in regenerating both forelegs and hind legs. This pattern suggests an adaptive tradeoff in energetic investments into leg regeneration that is sex-dependent in wolf spiders.

**Sheryl Evans** (Department of Natural Sciences, McPherson College, McPherson, KS [evanshe@bulldog.mcpherson.edu]), **WILGERS, DUSTIN** (Department of Natural Sciences, McPherson College, McPherson, KS [wilgersd@mcpherson.edu])  
Presentation Type: Oral Award: Not Competing TH 106 –2:50

## GEOGRAPHY

#### EMERGENCY RESPONSE UAV MAPPING RESPONSE TIME

Recent reductions of Small Unmanned Aerial Systems (SUAS) operations costs has increased potential acquisition of emergency response data. This data collection method has the ability to improve natural disaster assessment and response for communities. The focus of the project was to explore the ease of use, and speed of value added cartography for emergency

response. The method of data collection included record the response time of autonomous SUAS flight to collect a three-dimensional image. The Methodology of this project focuses on sending data from the location struck to an offsite location for image stitching, and value adding. Beyond cost the main factor in emergency response is time, the collection of Geospatial Information from arrival to visualization is approximately thirty minutes for sixty thousand square meters. Many benefits, and limitations were encountered while conducting this research sample.

**HILLS, DALTON** (Department of Geosciences [D\_hills@mail.fhsu.edu])

*Presentation Type: Oral*

*Award: Not Competing*

TH 112 —9:30

## GEOLOGY/PALEONTOLOGY

### UPLAND CHERT GRAVEL IN THE EMPORIA, KANSAS VICINITY: NEW EXPOSURES, OBSERVATIONS, AND STRATIGRAPHIC PROPOSAL

Recent excavations have exposed hilltop chert gravel in the northwestern portion of Emporia. These deposits are located on the drainage divide between the Neosho and Cottonwood valleys. Chert gravel is thoroughly leached and oxidized; matrix clay displays moderate reddish-brown (10 R 4/6) color. Highest chert gravel exceeds 1220 feet, and local topographic relief is more than 130 feet (>40 m). Assuming a late Pliocene age of 3 million years for highest chert gravel yields an average incision rate of ~1.3 cm/1000 years. Local gradient downstream for highest chert gravels is ~1 m/km. Neosho River valley gradient from Emporia to Neosho Rapids is ~0.95 m/km. This suggests valley gradients have changed little during the past few million years. Meanwhile, the Cottonwood River has migrated southward a distance of at least four miles (~6.5 km), which results in an average rate of lateral stream migration of ~2.2 m/1000 years. Chert gravel contains rare pebbles of quartzite, granite, quartzose sandstone, and dark chert. These exotic pebbles were derived from Ogallala-type alluvium in central and western Kansas and transported eastward across the Flint Hills by a through drainage. Much confusion has surrounded the stratigraphy of upland chert gravel. Classification varies widely from county to county, and these gravels are not included in the official stratigraphic nomenclature for Kansas. I earlier designated upland chert gravel in the Walnut drainage basin as the Leon Gravel (formation rank). I propose to expand this formation name to include all similar upland chert gravel deposits in east-central Kansas.

**ABER, JAMES** (Earth Science, Emporia State University [aberjim99@aim.com])

*Presentation Type: Poster*

*Award: Not Competing*

### DENTAL STRUCTURE OF THE LATE CRETACEOUS (MAASTRICHTIAN) GUITARFISH *MYLEDAPHUS PUSTULOSUS*

We examined surface collected teeth of *Myledaphus pustulosus* from the Upper Cretaceous (Maastrichtian) Hell Creek Formation of Garfield County, Montana. Macroscopic analysis of teeth show that 54% of the teeth have pronounced attritional wear due to a durophagous diet. A higher percentage of unworn teeth than worn teeth (64% vs 27%) have acid damage due to predation or scavenging. Ultrastructural analysis of whole and sectioned teeth show that the enameloid of the teeth is 100-125  $\mu\text{m}$  thick and is composed of a single crystallite enameloid in which apatite crystallites show no preferred orientation. Orthodontine in the tooth crown is composed of dense material with numerous canals for odontoblast processes which extend nearly to the tooth surface. Dentinal tubules surround odontoblasts most of the way through the enameloid. The enameloid microstructure of *M. pustulosus* is consistent with the pattern seen in other batoids.

**HOFFMAN, BRIAN** (Department of Natural and Physical Sciences, Park University [brian.hoffman@park.edu]), **Jeffrey Jensen** (Department of Natural and Physical Sciences, Park University [jeffrey.jensen@park.edu]), **Scott Hageman** (Department of Natural and Physical Sciences, Park University [shageman@park.edu])

*Presentation Type: Oral*

*Award: Not Competing*

TH 108 —9:30

### USING SOILS AND STRATIGRAPHY TO HELP ADDRESS IMPORTANT RIVER MANAGEMENT AND CULTURAL RESOURCE ISSUES IN KANSAS

In eastern Kansas, deposits of fine-grained Holocene alluvium in stream valleys have been assigned to a single lithostratigraphic unit, the DeForest Formation. In Kansas, the DeForest Formation consists of five formal members: Camp Creek, Roberts Creek, Honey Creek, Gunder, and Corrington. These different members have distinctive lithologies and degrees of post-depositional soil development. The DeForest Formation therefore provides a helpful stratigraphic framework for understanding spatial and temporal processes operating in stream valleys. In this study we utilize the U.S. Department of Agriculture Natural Resource Conservation Service (USDA-NRCS) SSURGO database, which contains information about soils collected over the course of the last century. By correlating various soil series with the different members of the DeForest Formation, this dataset can provide valuable spatial information that can be used to address important management questions. Here we illustrate how such a dataset can be used as a predictive tool for 1) evaluating the potential for buried cultural resources in stream valleys, 2) delineating areas that may be prone to streambank erosion, and 3) locating areas where legacy sediment (i.e., post-settlement alluvium) is stored that may be targeted in stream restoration efforts (i.e., floodplain reconnection).

**LAYZELL, TONY** (Kansas Geological Survey [alayzell@ku.edu])

*Presentation Type: Oral*

*Award: Not Competing*

TH 112 —10:30

### NEWLY RECOGNIZED FAULTS REVEALED IN HILLSHADED LIDAR IN EASTERN KANSAS

The relatively recent release of LiDAR in the State of Kansas has enabled geomorphic analysis at an ultra-fine scale. Vegetative cover is removed in Bare Earth LiDAR allowing the viewer to examine the land surface in detail. LiDAR hillshades reveal previously invisible geomorphic features. The majority of these features are found west of the Humboldt Fault. These features are expressed as muted ridges at the surface. After digitizing these features en masse, patterns were revealed. They are found in close proximity to, and parallel to known basement faults and structures. Where they are not, these features are likely the surface expression of unmapped basement faults. The layout of these faults assists in the structural interpretation of the region.

**PETERSON, ALAN** (Emporia State University [apeters3@g.emporiam.edu])

*Presentation Type: Oral*

*Award: Not Competing*

TH 112 —8:50

### THE EFFICACY OF ACQUIRING STRIKE-AND-DIP FROM HIGH RESOLUTION IMAGERY AND LIDAR IN THE FLINT HILLS OF CHASE COUNTY, KANSAS

The relatively recent release of high resolution imagery and LiDAR in the State of Kansas allows for the acquisition of bedrock strike and dip without ever visiting the site in question. Land cover and land use in the Flint Hills is ideal for this pursuit. Outcrops in the Flint Hills are visible as white stone lines in modern aerial imagery. Three points were placed in a configuration

as close to equilateral as possible on an outcrop and given elevation values from LiDAR. These and the map distance between the points were used to solve the so called three-point problems. This process was automated in ArcMap's Modelbuilder. This method was tested against measurements on the ground at the same locations on the Tallgrass National Prairie Preserve in Chase County, Kansas. The difference in readings from both methods was negligible. Given the problems with performing field work in remote regions over large areas, this is a useful tool for interpreting geologic structure where outcrops are visible in aerial imagery.

**PETERSON, ALAN** (Emporia State University [apeters3@g.emporia.edu])  
Presentation Type: Poster Award: Not Competing

#### **THE ORIGIN OF HIGH SILICA AND LOW pH IN THE GROUNDWATER OF THE KHORAT PLATEAU IN NORTHEASTERN THAILAND**

The groundwater of the Khorat Plateau in Northeastern Thailand is used as a water resource due to its excellent quality. The region is underlain by an aquifer system consisting of two zones separated by a clay lens. The system is composed of unconsolidated sediments deposited by the Chi and Mun River systems. These alluvial sediments contain an abundance of crystalline, cryptocrystalline, and amorphous silica minerals, overlain by highly weathered, iron-rich, laterite soils that allow for rapid recharge to the aquifer system. Silica concentrations in the system are higher than normally observed in natural environments. The solubility limits of silica minerals normally do not allow for dissolution in the conditions existing in the system. The system contains unusually low pH values, 5.0 to 6.4, that may result from the formation of silicic acid resulting from silica dissolution and a lack of a buffering capacity in the system. To evaluate this hypothesis, the saturation indices of silica minerals were determined along a groundwater flow gradient. Saturation indices generally increased down the flow gradient for crystalline, cryptocrystalline, and amorphous silica minerals demonstrating increasing dissolved silica concentrations down the flow path. Due to the rapid recharge and short residence time, water in the system may not reside in the system for a long enough period for waters to reach chemical equilibrium. A possible explanation for the low pH and high silica environment is the combination of rapid flow through silica minerals and lack of acid buffering conditions in the deepest regions of the system.

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Presentation Type: Oral Award: Master's graduate student TH 112 —10:10

#### **RECENT ADVANCES TOWARD DEVELOPING A U-PB ZIRCON CHRONOSTRATIGRAPHY OF CENOZOIC STRATA IN THE CENTRAL HIGH PLAINS AQUIFER OF KANSAS**

In portions of the central High Plains aquifer (HPA), groundwater withdrawals greatly exceed recharge—leading to dramatic water level declines and growing concerns for long-term sustainability. Significant geographic variance in water availability and aquifer response is likely derived from the formative processes and depositional histories of sedimentary units comprising the HPA. High-precision U-Pb zircon dates of volcanogenic and detrital zircons by LA-ICP-MS from the cores and outcrops in western Kansas were generated to improve correlation of heterolithic sedimentary units and to delineate significant hydrostratigraphic subunits. In ashbeds of the Ogallala Formation in Norton and Ellis counties, maximum depositional ages (MDAs) derived from the youngest zircon populations range from ~12.2–8.5 Ma. An ~20 m section of the Ogallala in Scott County show superposed MDAs ranging from ~11.35–6 Ma. These MDAs correlate with multiple Neogene-aged super-volcanic eruptions from the Snake River Plain-Yellowstone hotspot track (16.1–0.6 Ma). Cores from Haskell and Morton counties in southwestern Kansas, however, show superposed, progressively older MDAs ranging from 27.9±1.3 Ma to 35.7±0.7 Ma at depth. These zircons likely originated from explosive volcanism associated with the Mid-Cenozoic ignimbrite flare-up (36–18 Ma) which blanketed much of western North America in vast air-fall tuffs. The absence of Middle–Late Miocene zircons from southwestern Kansas is striking given that such grains are readily identified in the Ogallala Formation in north-central Kansas. MDAs in southwestern Kansas suggest Eocene to Oligocene age deposits time-equivalent to the Arikaree and White River Groups in Nebraska—ages previously unknown from Cenozoic strata in Kansas.

**SMITH, JON** (Kansas Geological Survey, University of Kansas [jjsmith@ku.edu]), **Greg Ludvigson** (Kansas Geological Survey, University of Kansas [gludvigson@kgs.ku.edu]), **Anthony Layzell** (Kansas Geological Survey, University of Kansas [alayzell@ku.edu]), **Andreas Möller** (Department of Geology, University of Kansas [amollier@ku.edu]), **Elijah Turner** (Department of Geology, University of Kansas [eli\_turner@ymail.com]), **Jason Hallman** (Department of Geology, University of Kansas [j802h124@ku.edu]), **Brian Sitek** (Department of Geology, University of Kansas [bsitek@ku.edu])  
Presentation Type: Oral Award: Not Competing TH 112 —11:30

#### **PRELIMINARY U-PB ZIRCON AGES OF THE ASHFALL FOSSIL BEDS IN NORTHEASTERN NEBRASKA: GEOCHRONOLOGY OF A KONSERVAT-LAGERSTÄTTEN IN THE NORTHERN HIGH PLAINS**

Ashfall Fossil Beds State Historical Park is the site of a renowned, world-class Konservat-Lagerstätte characterized by a mass-death assemblage of Miocene reptiles, birds and mammals in a ~3m thick, minimally reworked volcanic ash deposit. Past studies have geochemically correlated the ash horizon at Ashfall to the Ibex Hollow Tuff, a pyroclastic fall deposit extensive throughout the western U.S. and associated with the Bruneau Jarbidge eruptive center. However, this geochemical data is unpublished, leaving the age of the ash and associated Lagerstätte uncertain. For this study, we collected samples from four superposed stratigraphic intervals at Ashfall, and also from four superposed intervals at an exposed ash deposit ~6 km southeast of the Ashfall park at Grove Lake. Zircons were recovered from the lowermost sampled interval at both locations and subsequently analyzed via LA-ICP-MS, generating U-Pb ages of 11.93 ± 0.13 Ma for the Ashfall ash and 5.80 ± 0.13 Ma for the Grove Lake ash. These results corroborate previous work correlating the Ashfall Fossil Beds to the Ibex Hollow Tuff, which has an <sup>40</sup>Ar/<sup>39</sup>Ar sanidine age of 11.93 ± 0.03 Ma, determined on proximal deposits. The U-Pb age of ash from Grove Lake is coincident with reported ages for the Conant Creek Tuff from the Heise volcanic field in Idaho. Zircon U-Pb dating and geochemical analyses of primary ash fall deposits will help to better constrain the ages of important paleontological sites such as Ashfall Fossil Beds and to further refine chronostratigraphic interpretations in the Great Plains region.

**TURNER, ELIJAH** (Department of Geology, University of Kansas [eli\_turner@ymail.com]), **Jon Smith** (Kansas Geological Survey, University of Kansas [jjsmith@ku.edu]), **Andreas Möller** (Department of Geology, University of Kansas [amollier@ku.edu]), **Rick Otto** (University of Nebraska State Museum [rick.otto@unl.edu]), **Mathew Joeckel** (University of Nebraska-Lincoln [rjoeckel3@unl.edu]), **Shane Tucker** (University of Nebraska-Lincoln [stucker3@unl.edu])  
Presentation Type: Oral Award: Not Competing TH 112 —11:10

## SUSTAINABILITY OF THE HIGH PLAINS AQUIFER IN THE GROUNDWATER MANAGEMENT DISTRICTS OF KANSAS

The High Plains aquifer (HPA) is the most important water source for western and south-central Kansas, supplying over 90% of the irrigation water used in Kansas. Substantial water-level declines have occurred in the western (Ogallala) portion of the HPA and concerns exist over whether long-term declines will occur with current pumping in the HPA in south-central Kansas. We have developed a new approach for assessing the prospects for HPA sustainability based on average annual groundwater-level change and water use. Aquifer sustainability is defined as the pumping that would have produced an average water-level change of zero over the period of record used for the analysis. The amount of pumping reduction needed to achieve sustainability is the difference between the sustainable and average pumping for the period. We have applied this method to each of the five groundwater management districts (GMDs) in Kansas that cover the HPA. GMDs 4, 1, and 3, in northwest, west-central, and southwest Kansas, respectively, cover the Ogallala portion of the HPA. For both GMDs 4 and 1, the pumping reduction needed to achieve sustainability is 27% based on data for 2005-2015; for GMD3 the reduction is 34%. These regional pumping reductions are more practically achievable than previously thought. GMDs 2 and 5 extend across the HPA in south-central Kansas. For 2005-2015 data, the pumping reductions for sustainability are much smaller than for the Ogallala region; 2.5% for GMD5 and 1.5% for GMD2, due to substantially greater recharge from precipitation and stream-aquifer interactions.

**WHITTEMORE, DONALD** (Kansas Geological Survey, University of Kansas [donwhitt@kgs.ku.edu]), **James Butler, Jr.** (Kansas Geological Survey, University of Kansas [jbutler@kgs.ku.edu]), **Brownie Wilson** (Kansas Geological Survey, University of Kansas [bwilson@kgs.ku.edu])

Presentation Type: Poster

Award: Not Competing

## HEALTH AND MEDICINE

### PREVALENCE OF ANAPLASMA BOVIS IN YEARLING HEIFERS IN WESTERN KANSAS

*Anaplasma bovis* is a tick-borne bacteria, which infects erythrocytes in cattle. *A. bovis* infection is usually asymptomatic. However, when the animals are stressed, the infection develops symptoms which include anemia, fever, reduced body weight, pale mucus membrane, increased mucus secretion, and death in rare cases. The severity of symptoms appears to depend upon the age of the animal. Typically, transmission of *A. bovis* occurs via mechanical transmission due to a direct bite from a tick. In our previous study, 16 out of 50 ticks carried *A. bovis* based on polymerase chain reaction (PCR) screening for *A. bovis* 16s rDNA. Currently, very little is known about the prevalence of *A. bovis* in the cattle population in western Kansas. The object of the study, therefore, was to examine the prevalence of *A. bovis* in yearling heifers using the PCR. Blood samples were drawn from 42 yearling heifers during the weaning period in the fall of 2016. Genomic DNA was isolated from each specimen and screened for *A. bovis* 16s rDNA using PCR. The screening showed that 5 out of 42 heifers were positive for *A. bovis* 16s rDNA amplicon, suggesting that a limited number of yearling heifers that were examined carried *A. bovis* bacteria. We are currently examining the sequence of the *A. bovis* PCR amplicon to verify the identity of the PCR product. We also plan to develop the real-time PCR assay, and to examine additional routes of *A. bovis* transmission in FHSU calves.

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Presentation Type: Poster

Award: Undergraduate

## PALEONTOLOGY SYMPOSIUM

### THE NEW AGE OF AN OLD COLLECTION: BRINGING THE FOSSILS OF THE STERNBERG MUSEUM INTO THE DIGITAL REALM

To keep up in the digital age, the paleontology collection at the FHSU Sternberg Museum of Natural History (FHSM) is being updated to make it more accessible to researchers, educators, students, and the public. To do this, FHSM's Curator of Paleontology received two National Science Foundation grants to improve the condition of the collections, implement a customized relational database, and digitize the collections. For this century-old collection to survive another century, FHSM is improving the physical housing of the fossils by adding more archival containers and padding. Five years ago, the primary data management system was a card catalog and handwritten ledger system to record all specimen information. With the recent advances in freeware relational database programs, the paleontology collection is now implementing CollectiveAccess. CollectiveAccess enables digital storing of specimen data, associated metadata, and images, as well as making the database available online for public access. Photographing the fossils allows for virtual curation of the specimens. Publishing images online enables people to see the fossils and their state of completeness. In addition to publishing the database on the FHSM website, specimen information and images will be shared with data aggregators such as iDigBio and the Digital Atlas of Ancient Life. Together, these advances promote accessibility to the fossils and paleontological research focusing on these animals and their paleoecosystems. Additionally, it furthers the mission of the museum by providing new educational resources for educators, students, and the general public.

**BYRD, C. J.** (Sternberg Museum of Natural History [cjbyrd2@fhsu.edu]), **Laura E. Wilson** (Sternberg Museum of Natural History [lewilson6@fhsu.edu]), **D. D. Jorgensen** (Department of Geosciences, Fort Hays State University [ddjorgensen@mail.fhsu.edu]), **J. L. King** (Department of Geosciences, Fort Hays State University [jking9@email.fhsu.edu])

Presentation Type: Oral

Award: Not Competing

TH 108 —8:10

### BIG FISH, LITTLE FISH: WHERE ARE THE YOUNG AND JUVENILE XIPHACTINUS AUDAX FOSSILS?

*Xiphactinus audax* Leidy (1870) is well represented in the fossil record of the Late Cretaceous by the complete remains of very large adult fish, including the famous Fish-within-a-Fish, and at least one specimen measuring more than 5.6 m (18.5 ft). Almost all known, reasonably complete specimens are over 3.2 m (10 ft). These fish represent individuals that have taken a decade or more to reach at least sub-adult length. To date few, if any, remains of the young fish of this species have been reported from Late Cretaceous marine deposits. This raises the question of where were the young and juvenile individuals living, and suggests that *Xiphactinus* was an anadromous fish, spawning and spending some portion of its life in freshwater. Although there is a preservational bias favoring larger individuals, extensive collections of fossils involving thousands of fish specimens have been made from the Smoky Hill Chalk since the 1870s, and would certainly have included the remains of

smaller *Xiphactinus* if they had been present. Here I describe the fragmentary skull of a young *Xiphactinus audax* (FHSM VP-19158) collected in 1999 from the early Santonian Smoky Hill Chalk of northeastern Lane County, Kansas. The specimen consists of a complete, 42 mm left dentary in lateral view, and a complete, characteristic *Xiphactinus* left(?) premaxilla with one tooth. A small piece of the right dentary is still attached to the left dentary by the intermandibular suture. When living, this fish would have been about 0.4 m (12 in) in length.

**EVERHART, MICHAEL** (Sternberg Museum of Natural History, Hays, Kansas [mike@oceansofkansas.com])

Presentation Type: Oral

Award: Not Competing

TH 108 —8:50

#### **PRELIMINARY RESULTS OF LONG BONE HISTOLOGY IN AN ONTOGENETIC SERIES OF *CLIDASTES* (SQUAMATA: MOSASAURINAE)**

*Clidastes* is a basal member of the Mosasaurinae found in the chinks and shales laid down by the ocean that covered North America during the Cretaceous. Previous histological studies of mosasaurid long bones have focused on adult-sized bones, but no study to date has looked at an ontogenetic series for these marine reptiles. Here, osteohistology is used to study ontogenetic changes in the internal microstructure of *Clidastes*. Four humeri from the Upper Mooreville Chalk in Alabama were chosen to represent a size gradient, including humeri described as belonging to a neonate, juvenile, sub-adult, and adult based on size. Results indicate that the medullary cavity in *Clidastes* becomes less distinct as it is increasingly filled with trabeculae through ontogeny. This result is consistent with previous studies of *Clidastes* ribs, which show a similar ontogenetic pattern. Parallel-fibered bone is found in the cortical area of all samples and woven bone is found in the cortical area of the largest three, suggesting faster growth in later ontogeny. However, radially oriented vascular canals can be used to infer rapid growth in the two smaller bones. Decreasing vascular canal density and predominately longitudinal vascular canals in the two larger bones indicate decreasing growth rates with increasing size. It is unclear whether the largest bone in this study has reached skeletal maturity due to taphonomic alteration along the periosteal surface.

**GREEN, CYRUS** (Department of Geosciences, Fort Hays State University [ccgreen@mail.fhsu.edu]), **Wilson Laura** (Department of Geosciences, Fort Hays State University [lewilson6@fhsu.edu])

Presentation Type: Oral

Award: Master's graduate student

TH 108 —1:30

#### **THE FIRST RECORD OF AN ASSOCIATED TOOTH SET OF *PTYCHODUS ANONYMUS* (ELASMOBRANCHII: PTYCHODONTIDAE) IN NORTH AMERICA FROM THE JETMORE FORMATION IN KANSAS**

Isolated tooth specimens of the Late Cretaceous shark *Ptychodus anonymus* Williston are common occurrences in the Cenomanian and Turonian deposits throughout the Western Interior Seaway. Reported here is an association of 58 teeth of *P. anonymus* (FHSM VP-19170) recovered from the Jetmore member of the Greenhorn Formation (Late Cenomanian) in Mitchell County, Kansas. This specimen is significant as it represents the first occurrence of an associated dentition of this species. A single vertebra was also collected, which makes this the stratigraphically oldest occurrence of *Ptychodus* with associated post cranial remains. This tooth set consists of teeth from seven tooth file positions to the right and left side of a central medial file. This specimen demonstrates the complete heterodonty pattern in the dentition of *P. anonymus*, providing additional data to clarify the morphological variations that exist between each species of the Ptychodontidae.

**HAMM, SHAWN** (none [shamm821@gmail.com])

Presentation Type: Oral

Award: Not Competing

TH 108 —10:10

#### **HESLERODUS DIVERGENS (CHONDRICHTHYES: ELASMOBRANCHII) REMAINS FROM THE FARLEY LIMESTONE MEMBER OF THE LANE FORMATION (UPPER PENNSYLVANIAN, KASIMOVIAN) OF MISSOURI**

Acetic acid macerations of sediments of the Farley Limestone Member of the Lane Shale Formation of the Kansas City Group (Upper Pennsylvanian, Kasimovian) have yielded numerous teeth of the ctenacanthoid shark *Heslerodus divergens* Traut-schold. This shark has cladodont teeth with a five -cusped crown. The median cusp and two lateral cusps are long and sigmoidal in profile, with the median cusp being slightly larger. The lateral cusps diverge from each other at an angle of about 80 degrees, as measured from the base. These angles range from 55o – 96o, with a median measurement of 78.5o. There are also two smaller intermediate cusplets that form an angle of about 40o with respect to each other. The range of measure for these angles is 27o – 48o with a median of 38o. The lateral cusp angle/intermediate cusp angle ratio is about 2 (2.1 ± 0.3 95% confidence interval). The teeth are coated with a thin enameloid that is translucent and beige in coloration. The enameloid is single crystallite enameloid (SCE), characteristic of Paleozoic sharks. The cristae on the teeth appear to be thickenings of the enameloid with very little change in the shape of the edge of the dentin. In a mid-level section of a central cusp, the SCE of the lateral cristae thicken to about 60 µm and then thins down to about 2 µm in the trough between cristae.

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Presentation Type: Oral

Award: Not Competing

TH 108 —9:10

#### **WHAT DOES THE CO-OSSIFICATION OF THE VERTEBRAL AND PECTORAL GIRDLE ELEMENTS TELL ABOUT THE SKELETAL MATURITY OF *DOLICHORHYNCHOPS*?**

The genus *Dolichorhynchops* consists of four species: *D. osborni*, *D. bonneri*, *D. hershelensis*, and *D. tropicensis*. Adult size based on skeletal maturity is one character used to distinguish among the species. *D. bonneri* is the largest and *D. hershelensis* is the smallest species of *Dolichorhynchops*. The adult size of *D. hershelensis* is described as comparable to the size of a juvenile of *D. osborni*, with skeletal maturity based on the co-ossification of the neural spine to the centrum of the vertebra and the fusion of certain pectoral girdle elements. The condition of co-ossification of vertebral and girdle elements has long been used in plesiosaurs to estimate their ontogenetic stage. The purpose of this study is to test whether co-ossification is a valid method for determining skeletal maturity in the genus *Dolichorhynchops*. In this study, the *D. hershelensis* holotype (RSM P2310.1) was compared to two specimens of *D. osborni* (FHSM VP-404 and UCM 35059). UCM 35059 was previously described as a juvenile and is smaller in length than RSM P2310.1. FHSM VP-404 is similar in length to RSM P2310 and may be skeletally immature. Both *D. osborni* specimens show co-ossification of the neural spine to the centrum of the vertebrae and FHSM VP-404 also shows advanced ossification of some pectoral girdle elements. Since the vertebral co-ossification used to determine adulthood in the *D. hershelensis* is present in the presumably younger specimens of *D. osborni*, the characteristic cannot be used to determine skeletal maturity across *Dolichorhynchops*.

**HOLMAN, PIKE** (Department of Geoscience, Fort Hays State University [p holman@mail.fhsu.edu])

Presentation Type: Oral

Award: Master's graduate student

TH 108 —1:50



### **THE RELATIONSHIP AMONG SUTURE COMPLEXITY, SHELL FORM, AND FORMATION IN AMMONITES OF THE WESTERN INTERIOR SEAWAY**

Throughout ammonite evolution, shell suture patterns grew increasingly more complex, but the purpose of these immovable joints has long been debated. One hypothesis is that suture complexity relates to structural integrity of the shell under pressure. In this study, the suture patterns of coiled, straight, and heteromorphic ammonite shell forms from the Pierre, Carlile, Greenhorn, Graneros, and Mowry Shales were quantified using box-counting fractal analysis. Suture complexity was compared to shell form and formation to determine if there were significant differences in suture complexity, as a proxy for structural integrity, among shell forms or formations. If complex sutures aid in coiling, more complex suture patterns should be found in coiled shells, as suture complexity aid in structural integrity. Results indicate there is a significant difference in suture complexity among the defined shell forms ( $H = 27.88$ ,  $df = 2$ ,  $p < 0.001$ ). A Tukey's Multiple Comparisons test confirmed there is a significant difference between coiled and heteromorph shell forms ( $p < 0.03$ ), and a significant difference in suture complexity between heteromorphic and straight shell forms ( $p < 0.03$ ). However, there is no significant difference between straight and coiled shell forms ( $p > 0.03$ ). Results also indicate there is no significant difference among the median suture complexities and formation ( $H = 5.238$ ,  $df = 4$ ,  $p = 0.2637$ ), therefore there is no significant change over time. This may indicate complex suture patterns aided in tightly coiled shell forms, but was not needed in the looser heteromorph forms.

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Presentation Type: Oral

Award: Master's graduate student

TH 108 —2:10

### **NEW INFORMATION ABOUT THE LOCATION AND SKELETAL STRUCTURE OF THE TYRANNOSAURUS REX SPECIMEN AT THE MUSEUM OF WORLD TREASURES**

New information about the *Tyrannosaurus rex* at the Museum of World Treasures (MOWT L07-023-001) has shed light on its location in the Hell Creek Formation and on the structure and function of its trunk. MOWT L07-023-001 was recovered from Harding County, South Dakota. Its remains were recovered approximately 42 meters from the base of the Hell Creek Formation, placing it right in the middle of the formation. MOWT L07-023-001 has several well preserved gastralia. Many of the gastralia have two or more points of contact with each adjacent gastralium preventing a see-saw motion of the basket. It appears that the entire gastralial basket functioned as a unit. Muscular contractions along the abdominal walls could have elevated the basket during expiration and relaxed during inspiration. Material from MOWT L07-023-001 and from other tyrannosaurs suggest these creatures had several other skeletal elements in the trunk, including ribs, coracoid, sternal elements, and dorsal and sternal ribs. These elements, along with the gastralia, would have completely enclosed the trunk of a tyrannosaur, so the movement of the gastralial basket may have been important for respiration.

**KING, STEVEN** (Museum of World Treasures [sking@worldtreasures.org])

Presentation Type: Oral

Award: Not Competing

TH 108 —10:50

### **PRELIMINARY APPROACH TOWARD DETERMINING A TROPHIC LEVEL ORGANIZATION WITHIN ACTINOPTERYGIAN CLADES FROM THE WESTERN INTERIOR SEAWAY**

The Western Interior Seaway (WIS) was home to a wide variety of marine organisms during the Cretaceous period. Actinopterygians are ray-finned fish that were abundant throughout the seaway, and still have extant forms living in marine environments today. The abundance of different clades in the WIS makes it likely that each clade specialized within a certain ecologic niche. In order to understand how the roles of actinopterygians have changed through time, it is necessary to understand their roles in past environments. A way to approach this is by determining the trophic relationships among clades. This project focuses on determining a method to use to begin organizing the actinopterygian clades found in the WIS Niobrara Formation to create a basis for determining niche occupations and trophic relationships among the clades. The specimens used are fossil actinopterygians from Sternberg Museum of Natural History's collections and were collected from the Niobrara Formation. Twelve specimens were used to determine opening and closing lever ratios in the lower jaws. The lever ratios were used to evaluate the relationship between the force that the jaws could exert on their prey to the velocity at which they could close their jaws. An inverse relationship was expressed for all of the specimens, with *Protosphraena* having an unusually high force value compared to the velocity outcome. A functional morphospace was also created to determine the ecologic niche occupations of six genera. Referring to a previous study, the herbivorous niche is occupied by fish with relative jaw length ratios less than 0.08. Comparing jaw closing lever ratios with the relative jaw lengths of the six specimens, the genera that occupy the area of the morphospace with jaw ratios less than 0.08 were the *Micropycnodon* and *Ichthyodectes*.

**MICHEL, AMBER** (Department of Geosciences, Fort Hays State University [a\_michels@mail.fhsu.edu])

Presentation Type: Oral

Award: Master's graduate student

TH 108 —11:10

### **THE GREAT KANSAS WATER BEAR HUNT**

This is a research project to define the Ecology (Taxonomy, Distribution, Density, and Associations) of the phylum Tardigrada (Water Bears) across the whole state of Kansas while teaching the basic process of field research to middle and high school students and teachers. Most students have heard that tardigrades are the toughest animals on earth because of their ability to survive extreme temperatures, chemicals, gases, and pressures. They recognize the animal from the many great SEM images available. They know that it was the first multi celled animal to survive outer space. Many know it recently survived being frozen 30 years and some have heard that its gene history is controversial. Students seldom realize how easy the animal is to work with or how much we do not know about its diversity, distribution and ecology. Only 16 of 105 (15%) Kansas counties have records of the animals. The researchers propose a state wide survey for the phylum by enlisting the aid of secondary students from every county to collect samples of moss and lichen for the project. Students will be able to send in the samples or learn to process them and identify the water bears themselves. Students will be recognized and some will become authors and present their results at the Kansas Academy of Science annual meetings. There is also the great possibility for the discovery of new and unknown species of the phylum. Students will learn how to conduct field based scientific research.

**MILLER, WILLIAM R.** (Department of Biology and Chemistry, Baker University [William.Miller@BakerU.edu]) and **Jesi Rhodes** (Santa Fe High School)

Presentation Type: Oral

Award: Master's graduate student

TH 124 —8:30

### **TARDIGRADES OF NORTH AMERICA: PRELIMINARY COMPARATIVE X-RAY ELEMENTAL ANALYSIS OF LICHEN HABITAT**

The tardigrade is a microscopic, aquatic invertebrate that can be found between the thalli of lichens and the leaves of mosses on every continent of the world. The animals' exhibit cryptobiosis or the ability to desiccate as their habitat dries out and revive when moisture becomes available. Across North America, rain storms that result in sufficient moisture for activity are

infrequent events. The use of X-Ray Elemental Analysis has not been explored in the analysis of tardigrade habitat suitability. We looked at the elemental structure of 30 habitat samples from five different substrate trees in the two regions, one in north eastern Kansas and the other in central Massachusetts. Tardigrade habitat samples were ground into a homogeneous powder and pressed into 30 mm pellets using a 25-ton hydraulic press. Then a Rigaku NEX CG EDXRF (Energy Dispersive X-Ray Fluorescence) analyzer was used to determine the stoichiometry of the samples. The NEX CG spectrometer is capable of detecting and measuring the concentrations of elements from Na to U with ppm levels. We considered major elements to have concentrations greater than 1.0%, minor elements to have concentrations between 1.0% and 0.1 and trace elements to have concentrations less than 0.1%). This preliminary project found significant differences in the composition and concentrations of the elements relative to the geographic, substrate and habitats to which the animals are being exposed. The preliminary data suggests each species of tardigrade may have a range of tolerances relative to the different elements.

**TOME, MARIA FLORES** (Department of Mathematics and Physics [William.Miller@BakerU.edu]), **Andrew Emanuels** (Department of Biology and Chemistry [William.Miller@BakerU.edu]), **Colton Stallard** (Department of Biology and Chemistry [William.Miller@BakerU.edu]), **Mahmoud Al-Kofahi** (Department of Mathematics and Physics [William.Miller@BakerU.edu]), **William R. Miller** (Department of biology and Chemistry [William.Miller@BakerU.edu])  
Presentation Type: Poster Award: Undergraduate

#### **COMPARISONS OF FOSSIL BIOTAS OF THE LATE CARBONIFEROUS GARNETT AND HAMILTON QUARRY LOCALITIES, EASTERN KANSAS**

Garnett and Hamilton Quarry fossil localities of eastern Kansas represent one of the most comprehensive windows to near-shore terrestrial paleoecosystems of the Late Carboniferous, approximately 299 to 306 million years ago. Both localities contain exceptionally preserved plants, invertebrates, and vertebrates. Although Garnett and Hamilton have been compared globally to other Carboniferous localities, rarely are they compared to each other. A goal of this project was to make direct comparisons of the localities based on the fossil taxa to gain a better understanding of how their biotas are similar and different. Representatives of the invertebrates bivalves, brachiopods, arachnids, cockroaches, and dragonflies were found at both Garnett and Hamilton. However, genera of these groups at the two localities were completely different with the exception of *Neospirifer* and *Myalinella*. Furthermore, only Hamilton has gastropods, shrimps and millipedes. Among vertebrates, fish are the most diverse at Hamilton. Only coelacanths and xenacanthid sharks were found at both localities. Batrachomorph amphibians are found at both, whereas reptilomorph amphibians are only found at Garnett. The earliest and most primitive diapsid reptile is from Garnett, and Hamilton has a closely related species. In contrast, Hamilton has the most basal euplelesian synapsid, whereas Garnett has more derived species, even though the latter locality is older. At Garnett, seed ferns have the highest plant diversity and conifers the lowest, whereas at Hamilton it is the reverse. Overall, Garnett has a more terrestrial biota, whereas Hamilton Quarry has a more freshwater aquatic biota.

**WEHRBEIN, RANDOL** (Earth Science Department, Emporia State University [rlwehrbein@gmail.com])  
Presentation Type: Oral Award: Master's graduate student

TH 108 —11:50

#### **ECOLOGICAL VARIABLES AND BODY SIZE IN A 2.5-MILLION-YEAR RECORD OF WHITE-TAILED DEER**

White-tailed Deer (*Odocoileus virginianus*) is the most abundant large herbivore species in the eastern United States today. White-tailed Deer show marked latitudinal variation in size, with the smallest individuals in the southeast and the largest in the boreal forests of Canada. This close relationship between latitude and body mass, which meets the expectations of Bergmann's Rule, has been linked to climate effects on vegetation in some Holocene studies. Niche competition from overcrowding is known to also cause a decrease in body mass. If niche competition has a significant effect on longer time scales, then White-tailed Deer should be significantly smaller before the end-Pleistocene extinction that wiped out many large herbivores. I reconstructed body mass from leg measurements taken from Late Pleistocene-recent *O. virginianus* of Florida to test for the effect of niche competition. I used published stable isotope studies to limit comparisons to browsers only, excluding generalists and grazers. Samples from high browser competition environments (*Tapir*, *Paleolama*, *Mammuth*) were not significantly different ( $p > .05$ ) from samples with fewer or no competing browsers present. Subsequent analysis showed only minor variations in size, with no major effect of climate (glacial vs. interglacial) or time (NALMA). The most significant result was the large size of deer from a minority of glacial sites. White-tailed Deer showed relative stasis in body size otherwise. However, the stasis could also result from vegetation and competition being fine-scale effects not detectable at the broad resolution available here. Dental mesowear could find niche partitioning not seen here.

**WILLIAMS, DANIEL** (Department of Biology, University of Saint Mary [williams255@stmary.edu])  
Presentation Type: Oral Award: Not Competing

TH 108 —10:30

#### **THE ROLE OF SEABIRDS IN UNDERSTANDING LATE CRETACEOUS MARINE ECOSYSTEMS**

In modern marine ecosystems, seabird geographic distribution is correlated with physical, chemical, and biological oceanographic factors. Pursuit diving seabirds – those that actively pursue prey underwater using wing or foot propulsion – are more limited in distribution and closely tied to oceanographic factors because diving ability is often gained at the expense of flight capabilities. Today, pursuit diving seabird populations are restricted to waters cooler than 15°C. In contrast, Late Cretaceous marine environments were characterized by greenhouse climate and high sea levels, producing marine environments generally warmer than 15°C. Despite this, flightless pursuit diving seabirds called hesperornithiforms are particularly well-represented from North American Western Interior Seaway (WIS) deposits. The contrast in distribution implies that different biotic and abiotic factors may have affected Late Cretaceous epicontinental ecosystems than seen in today's oceans. Biotic factors like predator-prey relationships and competition are hypothesized to have affected fossil penguin diversity in the Cenozoic, and are also suggested to influence modern pursuit diving seabird distributions. However, the spatio-temporal overlap between hesperornithiforms, marine reptiles, and large predatory fishes does not support the same type of temperature-based competition or predator-prey relationships as the biogeographic driver in the WIS. Rather, it seems the different cast of characters (most notably the lack of marine mammals) accounts for biotic factors affecting hesperornithiform distribution. Additionally, the shallow depth, abundance of shoreline, and high primary productivity characterizing epicontinental seas are the abiotic factors likely explaining why pursuit diving seabird distribution was so different in the Late Cretaceous compared to today.

**WILSON, LAURA** (Sternberg Museum, Department of Geosciences, Fort Hays State University [lewilson6@fhsu.edu])  
Presentation Type: Oral Award: Not Competing

TH 108 —8:30