158th Kansas Academy of Science

and

96th Central States Entomological Society

Joint Annual Meeting Program

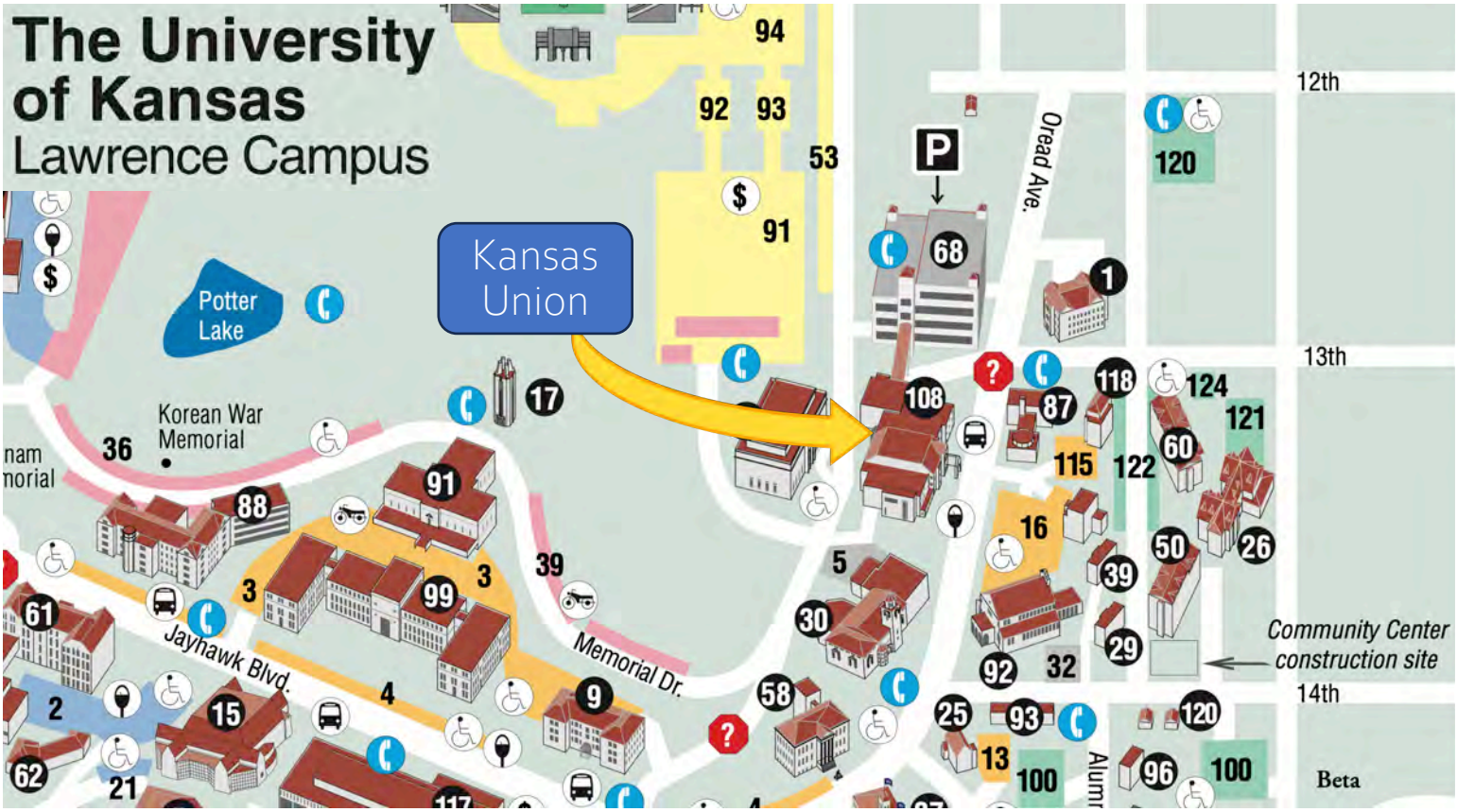
Lawrence, KS

April 10-11, 2026

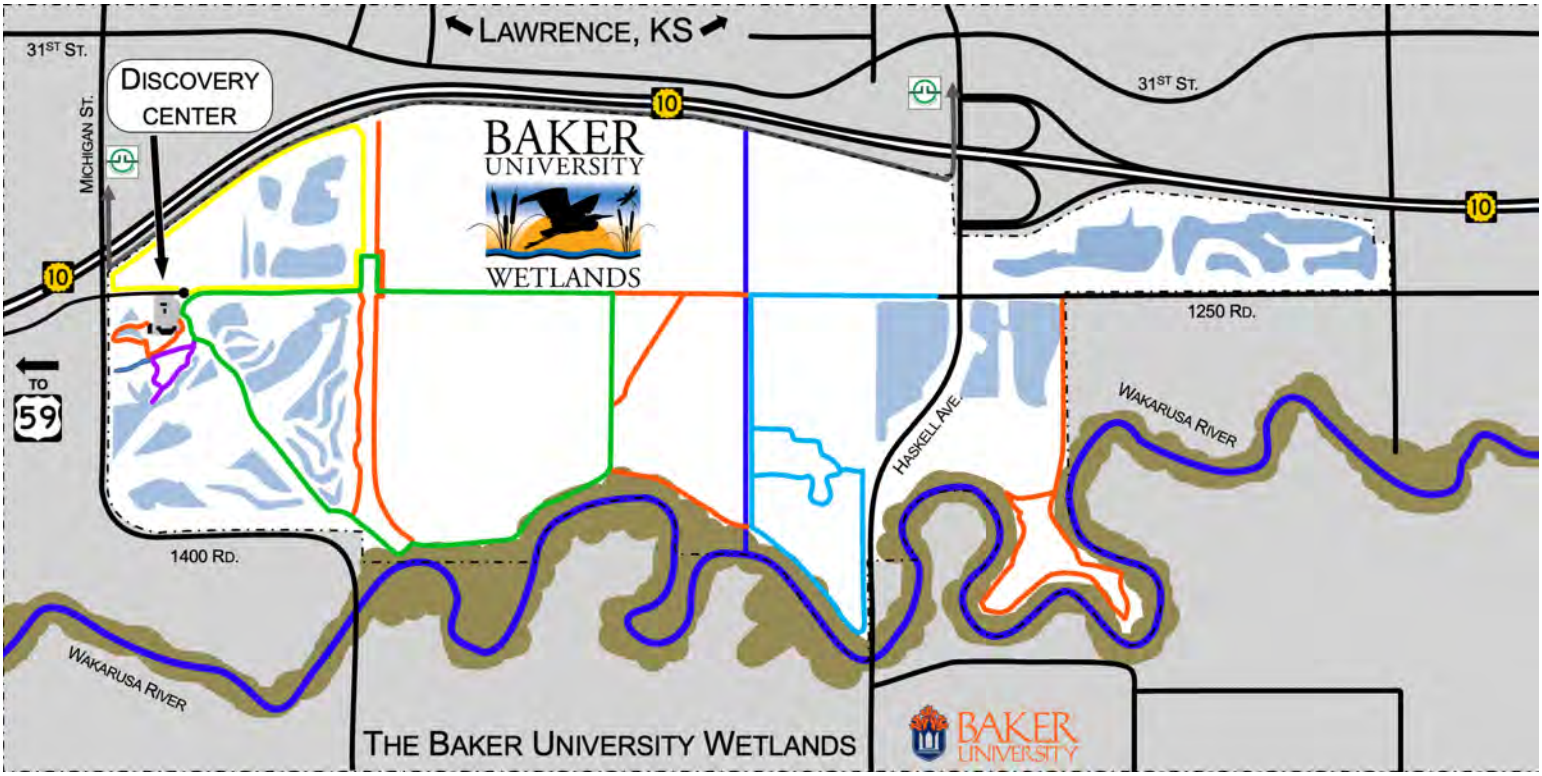
THE UNIVERSITY OF KANSAS

1858 BAKER UNIVERSITY

Maps of the University of Kansas and the BU Wetlands



*For more information about parking at KU, visit: parking.ku.edu/



KANSAS UNION

LEVEL 5

LEVEL 6

5th Floor Rooms	6th Floor Rooms
38 Jayhawk	48 English
39 Parlors	50 Kansas
40 Ballroom	51 Pine
43 Governors Room	53 Divine Nine
47 Big 12 Room	

Table of Contents

click this icon to return to Table of Contents

158TH KANSAS ACADEMY OF SCIENCE
AND
96TH CENTRAL STATES ENTOMOLOGICAL SOCIETY

Welcome to the 158th Annual Meeting of the Kansas Academy of Science and the 96th Annual Meeting of the Central States Entomological Society, co-hosted by the University of Kansas and Baker University!

The University of Kansas and Baker University are proud to host this joint meeting of two of the longest-lived scientific societies in the state of Kansas. Our universities' proud histories of scientific exploration and discovery have allowed us to be natural partners with KAS and CSES as we welcome you to two event-filled days of learning, networking, and camaraderie at the Baker University Wetlands and the campus of the University of Kansas, in Lawrence, KS.

THE UNIVERSITY OF KANSAS

KU is a top-tier teaching and research institution. From our first class of 55 students in 1866 to our current enrollment of over 30,000, KU thrives as an example of how insightful creators can empower the region and influence the world for the better. KU has global reach with a Kansas focus. Our main campus overlooks the historic city of Lawrence. The KU Biodiversity Institute is an internationally recognized center for research and graduate student education in evolutionary biology, systematics and biodiversity informatics, with curated collections of over 11 million plant, animal and fossil specimens and 2 million cultural artifacts. At the Kansas Biological Survey & Center for Ecological Research, we study ecological systems, both terrestrial and aquatic, in the Great Plains and beyond—including the effects of human use. We gather data on the ground and from satellite information systems. In collaboration with partners across KU, throughout the region and around the world, we collect, interpret and present scientific research-based information to peers and to planners and policy makers whose decisions affect us all. We are biologists, ecologists, geographers, geologists, mathematicians, engineers and geographic information systems specialists working within a diverse and synergistic group of programs. We also manage the 3,200-acre KU Field Station, where researchers and students explore the changing landscape through study not only in the natural sciences but also in the arts, the humanities and professional programs. The Center for Genomics coalesces KU researchers working in genomics into a collaborative group and supports and promotes genomics researchers through strategic initiatives. The Center for Molecular Analysis of Disease Pathways is an NIH Center of Biomedical Research Excellence (COBRE) focused on the creation and implementation of enabling technologies for the investigation of the genetic, biochemical and physical origins of disease. The Kansas Geological Survey is a research and service division that investigates and provides information about the state's geologic and groundwater resources.

BAKER UNIVERSITY AND THE BAKER UNIVERSITY WETLANDS

Founded in 1858 as the first university in Kansas, Baker is an institution with a storied past. While standing in the center of our beautiful campus in Baldwin City, a person can do a 360-degree turn and see three buildings on the National Register of Historic Places. Lady Margaret Thatcher dedicated our Osborne Chapel, which was moved brick by brick from Sproxton, England. Abraham Lincoln personally donated to the construction of Parmenter Hall. William Howard Taft, the 27th president of the United States, delivered the first speech on the topic of world peace 100 yards from where our current political scientists study. Given the university's rich tradition of academic excellence and historical significance—and our immaculate campus, which is a registered arboretum and Tree Campus Higher Education award winner—it's no surprise that George Will once called Baker University a "Midwestern Hidden Gem."

One of the most diverse habitats in Kansas, the Baker Wetlands encompasses 927 acres of rich, natural wildlife. Students, faculty, and nature lovers have identified 278 species of birds, 98 other vertebrate species, and 487 plant species at the Wetlands — and these counts grow with each adventure. This exceptional environment gives students the unique opportunity for increased exploration and education about biological and ecological processes.

The Baker University Wetlands and Discovery Center is paradise for our student biologists, ecologists, biochemists, and pre-health professionals. But our students aren't the only beneficiaries of the stunning 927-acre natural habitat. Stargazers, bird watchers, and exercise enthusiasts are always bustling around the area, which is open to the public. Located just 10 miles north of the Baldwin City Campus, the Baker Wetlands is a true distinction for the university in its region.

KANSAS ACADEMY OF SCIENCE

The Kansas Academy of Science was founded on September 1, 1868. It is the second oldest state Academy of Science in the United States, after Connecticut's. Article II of the constitution of the Kansas Academy of Science identifies the purpose of the Academy as (1) "To encourage education in the sciences and dissemination of scientific information through the facilities of the Academy" and (2) "To achieve closer cooperation and understanding between scientists and non-scientists, so that they may work together in the common cause of furthering science ."

The journal *Transactions of the Kansas Academy of Science* was established in 1872 and is the official journal of the Kansas Academy of Science. This peer-reviewed journal includes all subjects of biological, cultural, and physical sciences, mathematics and computer science, history and philosophy of science, and science education.

This weekend's meeting is the 152nd annual meeting of the Kansas Academy of Science. For more information about the history of the Kansas Academy of Science, membership, student grant opportunities, and the journal, please visit the Kansas Academy of Science website at www.kansasacademyscience.org.

CENTRAL STATES ENTOMOLOGICAL SOCIETY (KANSAS ENTOMOLOGICAL SOCIETY)

Formerly known as the Kansas Entomological Society, the Central States Entomological Society provides a forum for entomologists and welcomes as members all persons interested in insects or other terrestrial and freshwater arthropods, in all aspects of their ecology, behavior, systematics, physiology, control, and conservation.

The Society was established in 1925, and produces a peer reviewed quarterly publication, the Journal of the Kansas Entomological Society, which contains papers on regionally relevant topics by regional as well as international contributors. Beginning with Volume 95 (2022), the Journal transitioned from print to digital format. The Journal retains its original name to preserve historical continuity, but the Society changed its name to reflect regional inclusion.

The Society holds annual meetings in Kansas or other central states, where students as well as established entomologists present results of their research or reviews of topics of interest. All sessions are plenary! This fosters interactions among individuals across both disciplinary and organizational boundaries. For more information about becoming a member of The Central States Entomological Society, visit https://www.centralstatesentsoc.org/member-benefits-and-categories/.

158TH KANSAS ACADEMY OF SCIENCE
AND
96TH CENTRAL STATES ENTOMOLOGICAL SOCIETY
JOINT ANNUAL MEETING SCHEDULE

FRIDAY, APRIL 10, 2026

Baker University Wetlands Discovery Center, Lawrence, KS:

Time	Activity
3:30-5:30pm	Field Trip (meet at eastside parking lot): Birding walk through natural areas (see field trip information page for details)
4:30-5:30pm	Field Trip (meet at Discovery Center Foyer): Restoration and Outreach of the Baker University Wetlands (see field trip information page for details)
5:30-6:30pm	Check-in/social hour (main foyer of Discovery Center)
6:30-6:40pm	Welcome comments (Discovery Center main display room)
6:40-7:30pm	Dinner (Discovery Center main display room)
7:00-8:00pm	Feature Presentations (Discovery Center main display room)
8:00-9:30pm	KAS BOD meeting (Discovery Center classroom)
8:00-9:30pm	Field Trip (BU Wetlands observatory – weather permitting): Star-gazing

SATURDAY, APRIL 11, 2026

Kansas Union, University of Kansas, Lawrnce, KS

Time	Activity	Location	Floor
8:00	Registration		
	Breakfast sponsored by CSES		
	Poster set up	Hallway/Malott/Kansas	6
8:45	Opening remarks	Ballroom	5
9:00	Oral Presentations 1	see Oral Presentation Schedule	
9:20	Oral Presentations 2	see Oral Presentation Schedule	
9:40	Oral Presentations 3	see Oral Presentation Schedule	
10:00	Oral Presentations 4	see Oral Presentation Schedule	
10:20	Break	Pine Room	
10:40	Oral Presentations 5	see Oral Presentation Schedule	
11:00	Oral Presentations 6	see Oral Presentation Schedule	
11:20	Oral Presentations 7	see Oral Presentation Schedule	
11:40	Oral Presentations 8	see Oral Presentation Schedule	
11:30	Informational Tables	Ballroom	5
12:00	Lunch	Ballroom	5
12:15	Society Meetings	as directed	
1:00	Poster Presentations - Odd	Hallway/Malott/Kansas Rooms	6
1:45	Poster Presentations - Even	Hallway/Malott/Kansas Rooms	6
2:30	Keynote Speaker	Ballroom	5
	Judges meeting	Governor's Room	5
3:30	Awards	Ballroom	5
4:00	End of Meeting	travel to trip sites	
4:30	Field Trips		

BIG 12 ROOM – 5TH FLOOR

Talk	Time	Presenter	Title
1	9:00	Fox IS	THE RESULTS OF A THREE-SUMMER SURVEY OF THE INSECT FAUNA OF THE FORT LEAVENWORTH MILITARY INSTALLATION.
2	9:20	Nelson E	MICROCLIMATE MATTERS: INFLUENCE OF ENVVIRONMENT ON NATIVE AND NON-NATIVE ANT FORAGING.
3	9:40	Roeder DV	THERMAL PERFORMANCE MEDIATES FORAGING BY URBAN ANTS.
4	10:00	Kessen CM	RELATIONSHIPS BETWEEN PHYSIOLOGICAL TRAITS AND CRITICAL THERMAL LIMITS IN A COMMON KANSAN BUTTERFLY.
Break	10:20		
5	10:45	Herbison N	A CUCKOO SLUMBER PARTY? REDISCOVERY OF *NOMADA* (*PACHYNOMADA*) ASTERIS SWENK, 1913 (HYMENOPTERA: APIDAE), WITH NOTES ON UNUSUAL MALE AGGREGATORY BEHAVIOR.
6	11:10	Quezada A	BUTTERFLY RECORDS IN KANSAS: CONTRIBUTIONS FROM MUSEUM COLLECTIONS.
7	11:20	Belton CV	OPPOSING EFFECTS OF THE DEGENERATIVE SEX CHROMOSOME ON LIFESPAN IN A FRUIT FLY (*DROSOPHILIA AFFINIS*) VERSUS A BUTTERFLY (*BICYCLUS ANYNANA*).
8	11:30	Walters JR	SINGLE-NUCLEUS RNA-SEQ ANALYSIS OF DICHOTOMOUS SPERMATOGENESIS IN SILKMOTH, *BOMBYX MORI*.

Oral Presentation Schedule

Jayhawk Room – 5th Floor

Talk	Time	Presenter	Title
1	9:00	Muniu PN	EXPLORING SPATIO-TEMPORAL TRENDS AND CLUSTERS OF MENTAL HEALTH DURING COVID-19 IN THE GREAT PLAINS AND ROCKY MOUNTAIN REGIONS.
2	9:20	Westermann Salas L	PHYLOGENOMICS OF SOLOMON ISLAND FLYCATCHERS REVEAL COMPLEX EVOLUTIONARY RELATIONSHIPS WITHIN GENUS.
3	9:40	Baucom KE	EVALUATING RINGED CRAYFISH AS A DETERMINANT OF REDSPOT CHUB PREVALENCE IN THE SPRING RIVER SUBBASIN OF KS, MO, AND OK.
4	10:00	Geyer P	BUZZES OVER BURROWS: BATS AND BLACK-TAILED PRAIRIE DOGS IN WESTERN KANSAS.
Break	10:20		
5	10:40	Zhou Y	A LONG-TERM GREENHOUSE EXPERIMENT REVEALS STRONGER NEGATIVE PLANT–SOIL FEEDBACK BETWEEN DIFFERENT PLANT FAMILIES BUT NO EFFECT OF PERENNIALITY.C18
6	11:00	Sytsma J	CLIMATE-LINKED VARIATION IN STOMATAL TRAITS AND GAS EXCHANGE OF THE DOMINANT PRAIRIE GRASS ACROSS PRECIPITATION GRADIENTS.
7	11:20	Huggard DT	SEED DISPERSAL BY BISON (*BOS BISON*) AND ELK (*CERVUS CANADENSIS*) IN A MIXED-GRASS PRAIRIE.
8	11:40	open	

Oral Presentation Schedule

Pine Room – 6th Floor

Talk	Time	Presenter	Title
1	9:00	Rhinehart PD	NEW GENUS OF OMOMYID PRIMATE FROM THE EOCENE OF THE GREAT DIVIDE BASIN, WYOMING.
2	9:20	Miller KE	NEW MICROSYOPIDS (MAMMALIA:PRIMATOMORPHA) FROM THE LATE PALEOCENE OF TEXAS AND WYOMING ILLUMINATE THE EARLY EVOLUTIONARY HISTORY OF THE FAMILY.
3	9:40	Laser OM	PANTOWHO? IDENTIFICATION OF A NEW GENUS OF LATE PALEOCENE PANTODONT AND A REASSEMENT OF PANTODONT PHYLOGENY
4	10:00	open	
Break	10:20		
5	10:40	Forster HD	INIHIBITION OF GLYCOSYLATION WITH N-GLYCANS CONTAINING N-ACETYLGLUCOSAMINE AFFECTS L-AMINO ACID OXIDASE ACTIVITY IN THE FILAMENTOUS FUNGUS *ASPERGILLUS NIDULANS*.
6	11:00	Riney AD	THE POTENTIAL ANTIMICROBIAL EFFECTS OF NNSN COMPOUNDS.
7	11:20	open	
8	11:40	open	

Divine Nine Room – 6th Floor

Talk	Time	Presenter	Title
1	9:00	Velazquez Corral JA.	FROM THE BUILDING BLOCKS OF MATTER TO THE EARLY UNIVERSE.
2	9:20	Kampshoff MB	ENTANGLEMENT ENTROPY IN PARTICLE COLLISIONS.
3	9:40	open	
4	10:00	open	
Break	10:20		
5	10:40	Franz NM	THE KANSAS BIODIVERSITY DATA PORTAL – AN OPEN COLLABORATIVE COMMUNITY PLATFORM
6	11:00	Patrick LE	BUILD A MAMMAL BATTLES: BEYOND EXAMS IN MAMMALOGY.
7	11:20	Wuellner CT	UNLOCKING SCIENCE'S ACCESSABILITY, INFLUENCING SCIENTIFIC LITERACY, AND FOSTERING POSITIVE PERCEPTIONS OF SCIENCE IN THE PUBLIC THROUGH ART: AN EXPERIMENT CULMINATING IN A DYNAMIC, COLLABORATIVE, EDUCATIONAL ART INSTALLATION AND SCIENCE EXHIBIT
8	11:40	open	

Odd # posters presented in Session 1 **Even # posters presented in Session 2**

1 Aber JS; Aber SEW. HYDROPHYTE BLOOMS AT CHEYENNE BOTTOMS PRESERVE IN BARTON COUNTY, CENTRAL KANSAS.
2 Agunbiade O; Orellana KS; Franz N. DESIGNING A MODERN WORKFLOW FOR DIGITIZING AND PUBLISHING INSECT RESEARCH COLLECTION DATA AND IMAGES: THE EXAMPLE OF NAUPACTINI WEEVILS (COLEOPTERA: CURCULIONIDAE) IN THE KU ENTOMOLOGICAL COLLECTION.
3 Amego KS; Norton AE; Liu X; Chen M-S; Whitworth RJ. EFFICACY OF CONVENTIONAL NEONICOTINOID AND CARBON NANOTUBE–BASED SEED TREATMENTS AGAINST THE HESSIAN FLY
4 Aponte S; Bryant M; Choriego R; Harmon K; Haynes T ; Montoya E ; Starks T; Waters R; Jurcak-Detter A. GROW THOSE MUSSELS: A STUDY OF SIZE CLASS AND FRESHWATER MUSSEL GROWTH IN COWSKIN CREEK IN WICHITA KS.
5 Barnes AN. PRELIMINARY OBSERVATIONAL STUDY OF MORTALITY RATES OF SENILE DEGENERATION OF THE BRAIN VS. EDUCATION LEVEL.
6 Besson S; Bricker JWM; Rudnick G; Fairchild JM. STAR FORMATION AND GAS CONTENT IN VIRGO GALAXIES.
7 Beydler F; Morris ER. INVESTIGATING THE PERIOD GENE IN PERIODICAL CICADAS (*MAGICICADA SEPTENDECULA*).
8 Choriego R; Haynes T; Aponte S; Bryant M; Harmon K; Montoya E; Starks T; Waters R; Jurcak-Detter A. BIVALVES IN THE CITY PART 2: A STUDY OF FRESHWATER MUSSELS IN COWSKIN CREEK IN WICHITA KANSAS.
9 Corona A; Wolfe C; Wagner PG; Mercader RJ. DIFFERENTIAL BREAKDOWN OF MICROPLASTICS AMONGST THREE PRIMARILY PLANT EATING INSECT SPECIES.
10 Dexter LC; Chitwood M; Diaz Hernandez C; Hernandez S; Von Der Heyde TK; Osborn R; Falin Z; Franz N; Gonzalez V; Orellana KS. UNDERGRADUATE RESEARCH EXPERIENCES, KU ENTOMOLOGY COLLECTION.
11 Foster EF; Coole TC; Neff RN; Wilson DW; Cornish CMC; Cain BC; Frazier CF4; Hamersky MH; Harris TD. MONITORING MARY'S LAKE WATER QUALITY POST 2024 RESTORATION.
12 Frederiksen EK; Baum KA. ILLUMINATING POTENTIAL IMPLICATIONS OF ALAN ON MONARCH BUTTERFLY (*DANAUS PLEXIPPUS*) LIFE HISTORY.
13 Friesen A; Calvert R. EFFECTIVENESS OF MSO, AND NON-IONIC SURFACTANTS PAIRED W/ HERBICIDES ON *EUPHORBIA ESULA*.
14 Geiger E; Ortega-Ariza D; Smith R. EVALUATING THE POTENTIAL OF PORTABLE X-RAY FLUORESCENCE (pXRF) ANALYSES TO DETECT CRITICAL MINERALS USING MISSISSIPPIAN CORES IN SOUTHWESTERN KANSAS: PRELIMINARY RESULTS.
15 Grafel EB; Smith DR. BOOZY BEES---DO *COLLETES INAEQUALIS* BEES USE FERMENTED BROOD FOOD?

16 Jaimez-Padilla NA; Ortega-Ariza D; Fairchild JM. DEPOSITIONAL ENVIRONMENT INTERPRETATION OF MISSISSIPPIAN-AGE SUBSURFACE ROCKS FROM WESTERN KANSAS.
17 Jones, R. A.S.A. H. BLACKBOARDS.
18 Knoll LC; Patrick LE. POPULATION ESTIMATE AND VARIABLES ALTERING WHITETAIL DEER MOVEMENT AND ACTIVITY IN FORT LEAVENWORTH.
19 Liyanage RE; Sikes BA. PLANT–SOIL FEEDBACKS UNDER ALTERED PRECIPITATION SHAPE ABOVEGROUND TRAIT RESPONSES IN PRAIRIE PLANT SPECIES.
20 Long O; Rudra Sarma D; Ghosh A. METAGENOME ANALYSIS OF POULTRY LITTER COLLECTED FROM FARMS ACROSS EASTERN REGION OF KANSAS WITH A FOCUS ON ANTIBIOTIC RESISTANT AND FOODBORNE PATHOGENS.
21 MacDonald J; Smith JJ; Diffendal RF Jr.; Möller A. PRELIMINARY RESULTS OF ZIRCON-DATING VOLCANIC ASH BEDS IN THE OGALLALA GROUP, NORTHERN GREAT PLAINS REGION
22 Manning E; Ortega-Ariza D; Bohling GC. AIRBORNE ELECTROMAGNETIC (AEM) DELINEATION OF AQUIFER AND NON-AQUIFER LITHOLOGIES IN NORTHWESTERN KANSAS: IMPLICATIONS FOR AQUIFER HETEROGENEITY (PRELIMINARY RESULTS).
23 Manning I; Gonzalez VH; Youngblood A; Thrift C; Ostwald M; Seltmann K. 3D MODELING IMPROVES BEE SURFACE AREA AND VOLUME ESTIMATES: IMPLICATIONS FOR THERMAL TOLERANCE.
24 Mathison MG; Tang KK; Smith SY; Atkinson BA. FOSSIL FRUIT FROM THE LATE CRETACEOUS OF ANTARCTICA SHEDS LIGHT ON THE EARLY BIOGEOGRAPHICAL HISTORY OF CORNALES, THE DOGWOOD ORDER
25 McCreight RJ; Schmidt SE. ALTERNATIVE SOLVENTS TO DICHLOROMETHANE FOR RING CLOSING METATHESIS OF AZAMARCOCYCLES.
26 McGehee JG; Gleason JM. STARVATION TOLERANCE IN INDIVIDUALLY- AND GROUP-HOUSED *ZAPRIONUS INDIANUS* MALES AND FEMALES.
27 Melkonian Gakiya G; Wright G; Bjerke SL. A TALE OF TWO SCOBYS: KYLE AND BECKY.
28 Miller BW; Smith DR. SOCIAL AGGREGATION OR BEGRUDGING COHABITATION IN THE OPILIONID *LIBITIOIDES SAYI*?
29 Murray MA; Rhinehart PD; Beard KC. A NEW SPECIES OF THE EARLY EUTHERIAN *ACMEODON* FROM THE PALEOCENE OF THE BISON BASIN, FREMONT COUNTY, WYOMING.
30 Orth RO; Treml JA; Daggett ME; Mattingly BR; Thomas SO; Akhavan DA. ENGINEERING MACROPHAGES IN THE PURSUIT TO COMBAT SOLID TUMORS.
31 Paget AJ; Rhinehart PD; Miller KE; Anemone RL; Beard KC. NEW SPECIES AND LATEST OCCURRENCE OF THE EARLY METATHERIAN *MIMOPERADECTES* FROM THE EARLY EOCENE OF THE GREAT DIVIDE BASIN OF SWEETWATER COUNTY, WYOMING.

32 Pellegrini BS. A PRELIMINARY ANALYSIS OF THE IMPACT OF MATERNAL PARITY AND LITTER SIZE ON THE POST-NATAL GROWTH PERFORMANCE OF DOMESTIC LAMBS.
33 Peterson KS; Gleason JM. DEVELOPING GENETIC MARKERS FOR PARENTAL DETERMINATION IN *DROSOPHILA SUZUKII*.
34 Puerta GLB; Leung SH. SELECTIVE OXIDATION OF SUBSTITUTED PYRROLES USING OXONE AS A GREEN OXIDIZING AGENT.
35 Richey A. ASSESSING THE EFFECT OF ENVIRONMENTAL STRESSORS ON NATIVE POLLINATORS.
36 Riner MA; Ortega-Ariza D; Fairchild JM. PALEOENVIRONMENTAL CHANGES DURING THE MIOCENE IN A TROPICAL SHALLOW SEA, PUERTO RICO.
37 Sanford NW; Russell FL; Houseman GR. EFFECTS OF MERISTEM MINING BY INSECTS AND SOIL NUTRIENT AVAILABILITY ON THE PHENOLOGICAL DEVELOPMNET OF *CIRSIUM ALTISSIMUM* (TALL THISTLE).
38 Steigner DA; Gutierrez AJ; McCormick LF. GREEN HYPOCHLORITE OXIDATION OF PRIMARY ALCOHOLS TO CARBOXYLIC ACIDS FOR THE UNDERGRADUATE ORGANIC CHEMISTRY LABORATORY.
39 Szaraz FL; Nguyen AT1; Hileman LC; Matsunaga KKS1. THE EVOLUTION AND EXPRESSION PATTERNS OF ORGAN POLARITY GENES IN THE NORWAY SPRUCE.
40 Tackett A; Calvert R. THE CONNECTION BETWEEN SLEEP AND MUSCLE HEALTH IN COLLEGE ATHELTES.
41 Thompson LK, Mulcahy KD. AN EXCEPTIONAL SPECIMEN OF THE LATE CRETACEOUS ANACORACID SHARK, *SQUALICORAX* FROM THE PIERRE SHALE OF WYOMING
42 Vinton G; Rault L. FROM BLOOD MEAL TO EGGS: ABC TRANSPORTERS IN MOSQUITO REPRODUCTIVE BIOLOGY
43 Wagner PG; Wagner TE; Cadan GD. COMPARISON OF ACUTE PHYSIOLOGICAL RESPONSES TO TWO VOLUNTARY HYPERVENTILATION PROTOCOLS IN COLLEGE-AGED PARTICIPANTS AT REST.
44 Wiiest AG. TRAINING THE TRAINER: ANIMAL TRAINING AND WHAT WE CAN LEARN FROM OUR ANIMALS
45 Winters H; Eggleston J; Sytsma J; Ricker A; Galliart M; McGuire A; Collinsworth E; Johnson L. INTRASPECIFIC CLIMATE ADAPTATION AND RESPONSE TO VARIATIONS IN PRECIPITATION IN A DOMINANT PRAIRIE GRASS.
46 Zabinski WJ. UTILIZING NATURAL HISTORY COLLECTIONS AND DATA MINING TO ASSESS FLOWER ASSOCIATIONS AND PHENOLOGY OF NORTH AMERICAN BEES IN THE GENUS *ANDRENA* (HYMENOPTERA: ANDRENIDAE) SUBGENUS *PLASTANDRENA*.
47 Zhang Q; Alex Swider. HEMP AS A HIVE PROTECTOR: HPLC DETECTION OF PHYTOCANNABINOIDS IN FORAGING HONEY BEES.

2:30PM SATURDAY, APRIL 11, 2026

"The Good, The Bad and The Personal"

Dr. Donald G. Huggins

Dr. Donald Huggins is the director and founder of the Central Plains Center for Bioassessment, professor emeritus at the University of Kansas, and the author of over 100 technical documents and articles, including a plethora of works on the assessment of aquatic ecosystem health and the much-loved Guide to the Freshwater Macroinvertebrates of the Midwest (1985) and Kansas Fishes (2014).

Don's work is all-encompassing when it comes to water quality. He got his start in fisheries science during his master's at Iowa State University, then studied environmental health science during his PhD at KU. His subsequent career as an aquatic ecologist has covered everything from fish diversity surveys in Kansas lakes, to developing metrics by which to measure macroinvertebrate community response to anthropogenic pollutants, and to his most recent works on structural equation modeling to assess the effects of toxins on aquatic ecosystems.

Don's research has taken him around the world, but fortunately for us, much of his work has taken place right here in Kansas. He has a long history of service on boards and committees to consult on and develop methods to assess threats to aquatic life, monitor conditions in our states' reservoirs, and to reduce nutrient loads in our freshwater systems, which he continues to serve on well into his bustling retirement.

Don hails from the state of Iowa but recently has been enjoying a (somewhat) quieter life in retirement in San Jose, Costa Rica.

7:00PM FRIDAY, APRIL 10, 2026

Baker University Wetlands Discovery Center

"Baker University Wetlands: History, Ecology, and Ongoing Management"

Andrew Rutter, Director, Baker University Wetlands

Andrew Rutter became Director of the Baker University Wetlands Discovery Center in 2024 as part of a partnership agreement between Baker University, Ducks Unlimited Kansas and Kansas Alliance for Wetlands and Streams (KAWS). He earned a BS in biology from Emporia State University in 2013 and MS with the Southern Illinois University Cooperative Wildlife Research Laboratory in 2017. Mr. Rutter worked several years as a wildlife ecologist in northern Illinois, then moved to Lawrence to work for the Kansas Department of Health & Environment to help farmers and ranchers on private lands in conservation efforts to address water quality impairments. Before becoming Director of the Baker University Wetlands, Mr. Rutter worked for KAWS to address water quality impairments in the Upper Wakarusa Watershed upstream of Clinton Lake.

7:30PM FRIDAY, APRIL 10, 2026

Baker University Wetlands Discovery Center

"Interstellar Visitors and Micrometeorites"

Dr. Michael C. Sitarz, Assistant Professor of Physics, Baker University

Interstellar Objects are exciting and rare visitors from star systems outside of our own. With only three confirmed objects so far, much work has been done on identifying and studying where these visitors originated from and what they are made out of. This also leads into the exciting field of micrometeorites. Small, nearly imperceptible objects that collect on our very own roofs every day. Studies of these can lead to answers to vast questions about the birth story of our own Solar System and if many of its inhabitants are actually from here. The Interstellar Objects group at the University of Kansas and Baker University is studying various projects related to these topics and an overview talk of our work.

Dr. Sitarz received his BS at the University of Alabama in physics with a specialty in astrophysics and a double concentration in scientific mathematics, then earned his MS (physics: dark matter and cosmology) and PhD (physics: astrophysical plasmas around supernovae and black holes) at the University of Kansas. Currently part of the Physics Education research group and interstellar visitors group, both at KU, he has two students at Baker University beginning research into stars and stellar evolution and continues his own work investigating dark matter.

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FRIDAY, APRIL 10, 2026

1

Birds of the Baker University Wetlands

4:00-5:30pm

Join Dr. Scott Kimball, Professor of Biology, Baker University, on a walk along the trails of the wetlands to view waterbirds, songbirds, raptors, and other birds commonly found in the mixed wetlands landscape of the Baker University Wetlands. Learn how Baker University students and faculty use the wetlands for research, teaching, and learning. Plan for 1.5hrs of slow walking along flat trails of gravel, grass, and dirt.

meeting location: BU Wetlands east parking lot @ intersection of 1250 Rd. and Haskell Ave.

2

Baker University Wetlands Tour

4:30-5:30pm

Join Andrew Rutter, Director, Baker University Wetlands, to learn about the history and mission of the Baker University Wetlands through displays and discussion. View historical and recent restoration efforts and hear about current and future management issues facing the Wetlands.

meeting location: BU Wetlands Discovery Center

3

Stargazing at the BU Wetlands

8:30-9:30pm

Join Dr. Michael Sitarz, Professor of Physics, Baker University, to view stars, planets, and other astronomical phenomena using telescopes while discussing the value of dark skies and space with local astronomy experts.

meeting location: West side of BU Wetlands Discovery Center near telescope dome.

SATURDAY, APRIL 11, 2026

1

Monarch Watch
4:30-5:15pm
Join Cailin Kessin at Monarch Watch, for a tour of the Monarch Watch operations and garden.
meeting location: Foley Hall, 2021 Constant Ave.

2

KU Entomology Collections
4:30-5:15pm
Join Victor Gonzalez for a tour of the KU Entomology collections.
meeting location: Public Safety Building, 1501 Crestline Dr.

3

KU Field Station
4:45-6:00pm
Join Bob Hagen for a tour of the facilities at the Field station.
meeting location: Armitage Education Center, 350 Wild Horse Road, Lawrence, KS

Meeting registration occurs through the Kansas Academy of Science website.

Regular member

Member Registration	$60.00
Non-Member Registration	$100.00
Regular Membership (new or renewal)	$25.00

This is for renewal or initiation of Central States Entomological Society Membership

Students

Member Registration	$40.00
Non-Member Registration	$60.00
Student Membership (new or renewal)	$5.00

This is for full-time students who wish to be members of CSES

Retirees

Member Registration	$60.00
Non-Member Registration	$100.00
Retired Member (new or renewal)	$20.00

This is for people who are currently retired but want to be members of CSES

Abstract Submission Guidelines

It is in the abstract that you summarize your presentation in as few words as possible, including such things as what you expected to find, what you actually did find, and any interpretations you made about the data. Abstracts usually begin with one or two sentences of background followed by clear statements of the hypothesis and predictions, a methods sentence, and a sentence of results. The final sentence should convey the "big picture" conclusion of your study.
Follow these guidelines ***exactly*** to ensure acceptance of the presentation into the meeting program.

1. List each author's name (Last Name/First initial/Second initial –**no commas!**) beginning with the presenter and others added in the order in which you want them to appear in the Meeting Program, separating each author with semicolons. End your author list with a period.
2. Add author institution affiliation parenthetically immediately following each author's name. See below for an example.
3. Title of the presentation (IN ALL CAPS) followed by a period.
4. Body of the abstract – limit abstract body to maximum 500 words.

When all else fails, follow the model below:

Example abstract:

Presenter AB (Fantastic State University); Otherauthor CD (Kansas Department of Great Science). THE TITLE OF THIS PRESENTATION IS INFORMATIVE AND INTERESTING. Though many papers presented at the Kansas Academy of Sciences annual meeting cover sciencey topics, this presentation abstract is only an example of how to write an abstract. In writing this abstract, it occurs to us that we do not have very much to say about how to write an abstract other than what has been said above. So, in following the directions above, you will be sure to have written an informative, succinct, and well-organized abstract worthy of presentation in the meeting program and later publication in the Transactions of the Kansas Academy of Science. Having now written this abstract, we see that we have confirmed our hypotheses that writing an abstract is a valuable exercise and that an abstract is worthy of proofreading.

ORAL PRESENTATION ABSTRACTS (FIRST AUTHOR PRESENTER)

Baucom KE[1]; Whitney JE[1]; Holloway J[1]; King A[1]; Lawson A[1]; Leeper J[1]. EVALUATING RINGED CRAYFISH AS A DETERMINANT OF REDSPOT CHUB PREVALENCE IN THE SPRING RIVER SUBBASIN OF KS, MO, AND OK.
[1]Pittsburg State University
The Redspot Chub (*Nocomis asper*) is a threatened species in Kansas that is on the verge of extirpation. A lack of prey could potentially be contributing to the rarity of Redspot Chub in Kansas, as it was discovered in Oklahoma and Arkansas during 2018-2019 that large adult Redspot Chub specialize in consuming Ringed Crayfish (*Faxonius neglectus*). The objective of our research was to investigate the importance of Ringed Crayfish relative to other environmental variables in explaining variation in Redspot Chub prevalence in the Spring River subbasin of KS, MO, and OK. We accomplished this objective by quantifying Redspot Chub and Ringed Crayfish densities, in addition to several environmental variables, across 54 sampling events during June-August of 2024-2025. We created thirteen competing models that evaluated the importance of Ring Crayfish density relative to water quality, physical habitat, stream size, and biotic interactions in their ability to explain variation in Redspot Chub density. Comparisons revealed that a model that included an interaction between Ringed Crayfish density and stream size was most parsimonious, explaining 61% of the variation in Redspot Chub density. Ringed Crayfish abundances were sparse in Kansas compared to neighboring states, which may explain the scarcity of Redspot Chub.

Belton CV[1]; Walters JR[1]. OPPOSING EFFECTS OF THE DEGENERATIVE SEX CHROMOSOME ON LIFESPAN IN A FRUIT FLY (*DROSOPHILIA AFFINIS*) VERSUS A BUTTERFLY (*BICYCLUS ANYNANA*).
[1]University of Kansas
Among animals, one sex typically is shorter lived than the other, but which sex is shorter lived differs across taxa. For taxa with XX/XY sex-determination systems the males tend to be shorter lived, whereas in taxa with ZZ/ZW sex-determination systems the females are typically shorter lived. So while shorter-lived sex changes, it appears consistent that the sex with heterogametic-sex chromosomes is shorter lived. This pattern may reflect the “toxic Y hypothesis”, which suggests that degenerative sex chromosome(e.g. Y or W) causes a shorter lifespan in the sex that possesses it. We have tested this hypothesis with experiments within two study species, *D. affinis* (a fruit fly) and *B. anynana* (a butterfly), both with natural in the presence of the degenerate sex chromosome. In *D. affinis* we compared XX/XY and XX/XO strains, and in *B. anynana* we compared ZZ/ZW and ZZ/ZO strains. In both species, the presence of the degenerative chromosome appears to impact lifespan, but in opposing direction. In *D. affinis* we compared XY males outlived XO males, but in *B. anynana* ZO females outlived ZW females. This suggests that while the degenerative sex chromosome may negatively affect longevity across some species, in other species its impact may beneficial or offset by other species-specific factors that also influence longevity.

Forster HD[1]; Steyer JT[1]; Todd RB[1]. INIHIBITION OF GLYCOSYLATION WITH N-GLYCANS CONTAINING N-ACETYLGLUCOSAMINE AFFECTS L-AMINO ACID OXIDASE ACTIVITY IN THE FILAMENTOUS FUNGUS *ASPERGILLUS NIDULANS*.
[1]Kansas State University
Nitrogen nutrient utilization is necessary for cell growth. In the model filamentous fungus *Aspergillus nidulans*, the sarA gene (AN2350) encodes an L-amino acid oxidase (LAAO), an enzyme that deaminates amino acids to provide ammonium, which can be directly used for growth. Previously we determined that deletion of the sarB gene, which encodes a putative ER-localized UDP-N-acetylglucosamine (UDP-GlcNAc) transporter, leads to decreased enzyme activity of the SarA LAAO. GlcNAc plays vital roles in glycosylation, post-translational modifications that can affect protein function, but these processes are poorly studied in filamentous fungi. To test the hypothesis that glycosylation is necessary for full SarA LAAO activity, the presence and possible impact of glycan modifications in SarA was evaluated. BLAST analysis of the *A. nidulans* genome revealed one gene encoding a putative N-GlcNAc transferase (GNT), predicted to add GlcNAc to N-glycan trees, and one encoding a putative O-GlcNAc transferase (OGT) predicted to mediate O-GlcNAcylation. Glycosylation predictive tools found seven possible N-glycosylation and six possible O-GlcNAcylation sites on SarA. All potential N-glycan sites were highly conserved in uncharacterized SarA orthologs in aspergilli and three were conserved with confirmed N-glycosylation sites in other species. To test for the presence of N-glycans on SarA, *A. nidulans* was cultured in liquid media lacking or containing tunicamycin, an antibiotic that prevents the first step in N-glycan formation. Using a colorimetric test to detect a byproduct of LAAO-catalyzed deamination, microplate reader analysis of soluble cell extracts showed significantly less LAAO activity in samples grown with tunicamycin. A gel-based qualitative assessment similarly indicated treated samples exhibited less LAAO activity and additionally showed increased mobility of SarA activity compared with untreated samples, suggesting tunicamycin prevented addition of N-glycans. These results strongly indicate the presence of one or more N-glycans on SarA. To assess the impact of N-glycan removal from mature SarA protein, soluble cell extracts were treated with PNGase F, which cleaves N-glycans from proteins. PNGase F-treated samples showed a modest but statistically-significant decrease in LAAO activity compared to untreated samples. This decrease was not visible on the in-gel assay, nor was it possible to discriminate a change in mobility of treated samples. Results in the N-glycosylated ovalbumin control indicated that PNGase F treatment may have resulted in only partial de-glycosylation, which may account for the observed results for SarA in cell extracts. A third experiment to assess possible O-GlcNAcylation of SarA was unsuccessful. If SarB supplies GlcNAc to GNT and/or OGT for glycosylation of SarA, deletion of these genes should phenocopy the effects of sarB deletion on SarA LAAO activity. The GNTD mutant exhibited slightly higher LAAO activity than wild type and a small increase in protein mobility, while the OGTD mutant exhibited slightly less LAAO activity and no mobility changes. Neither phenotype copied that seen in sarBD mutants. Taken together, these experiments show that SarA is N-glycosylated and that these glycans are necessary for full SarA activity. Importantly, they also provide evidence of GlcNAc-decorated N-glycans in filamentous fungi. However, the mechanism by which SarB UDP-GlcNAc transporter function affects SarA remains unclear.

Fox IS[1]; Stark WJ[1]. THE RESULTS OF A THREE-SUMMER SURVEY OF THE INSECT FAUNA OF THE FORT LEAVENWORTH MILITARY INSTALLATION.
[1]Fort Hays State University
Fort Leavenworth is a place of both cultural and biological importance within Kansas due to its status as the oldest continuously operating US military installation west of the Mississippi River, and its extensive tracts of some of the last Missouri River old-growth floodplain woodlands. As a military installation, Fort Leavenworth is required to periodically conduct biological surveys to ensure its activities do not negatively impact the local ecosystem. As part of one of these surveys, insect sampling was conducted in the summers of 2023, 2024, and 2025 through the use of approximately 105 insect traps of various types. Over the course of the survey, approximately 10,000 individual insects were captured and identified, several rarely encountered species were collected, and multiple species were recorded from Kansas for the first time.

Franz NM[1]; Orellana KS[1]; Gilbert EG[1]; Gonzalez VH[1]; Pearson KD[1]; Post G[1]; Von Der Heyde T[1]; Walker LJ[1]. THE KANSAS BIODIVERSITY DATA PORTAL – AN OPEN COLLABORATIVE COMMUNITY PLATFORM
[1]University of Kansas
The State of Kansas is home to more 20,000 species of plants, fungi, animals, and other organismal groups. The biodiversity of the state is documented in research-grade collections housed at universities, museums, field stations, gardens, and other institutions whose members preserve and curate the specimens. The data are then leveraged by researchers to answer fundamental and applied questions about the biodiversity of Kansas. In 2025 the Symbiota team at the University of Kansas, Biodiversity Institute & Natural History Museum (https://biodiversity.ku.edu/symbiota-support-hub) newly established a Symbiota portal designed to promote a broad community of Kansas-focused biodiversity collections of specimens and observations to manage and share their data. The portal – available at https://ks.symbiota.org/ – presently publishes more than 450,000 occurrence records pertaining to nearly 7,000 species. The Kansas Biodiversity Data Portal community is open to and welcomes all collections and individuals who wish to publish, manage, and analyze Kansas-based biodiversity occurrence data – especially in the form of digitized specimens. Symbiota portals are designed to promote community-driven collaborations, specimen data and associated media mobilization, and the use of interactive tools that support state-wide biodiversity monitoring such as regional species checklists and taxonomic keys. Our call to explore collaborations and community synergies includes academic and other institutions such as non-/governmental organizations or biodiversity interest groups located and active throughout the state. For questions, including requests to join the portal as individual members or new collections, please email help@symbiota.org. The Symbiota team and the University of Kansas are acknowledged for their support.

Geyer P[1]; Roemer J[2]; Patrick L[1]. BUZZES OVER BURROWS: BATS AND BLACK-TAILED PRAIRIE DOGS IN WESTERN KANSAS.
[1]Fort Hays State University; [2]The Nature Conservancy
Grasslands, and by extension grassland organisms, are threatened. Two grassland taxa facing numerous threats in Kansas are bats and black-tailed prairie dogs. Despite the threats to their populations, these mammals provide services to the areas they inhabit; prairie dogs act as ecosystem engineers, and bats consume economically important agricultural pest insects. Given their contrasting natural histories, an association between these two mammals was not considered until recently. Acoustic studies in eastern Colorado and at Smoky Valley Ranch (SVR) in Logan County, KS, both noted that bats echolocate significantly more over black-tailed prairie dog colonies compared to adjacent non-colony sites. A pilot automated telemetry study at SVR suggested that bats used the edge between the prairie dog colonies and the adjoining habitat. These studies raised the question of how bats utilize prairie dog colonies and whether increased activity reflects foraging behavior or simply commuting along habitat edges. This study addresses these knowledge gaps by testing whether increased bat activity extends deeper into prairie dog colonies. Acoustic detectors were deployed near the edge (25m), and further from the edge (225m), at 3 sites at SVR. Like previous years, we found that bats echolocated significantly more over prairie dog colonies at the 25m from edge detectors. However, at 225m, this trend reverses, with bats echolocating significantly more at non-colony detectors than at detectors on prairie dog colonies. Brazilian free-tailed bats (*Tadarida brasiliensis*) and hoary bats (*Lasiurus cinereus*) were significantly more active over colony detectors, while western small-footed myotis (*Myotis ciliolabrum*) were significantly more active over non-colony detectors. Future work will examine proximity to roosting sites and water source covariates to better understand the drivers behind our results. An improved understanding of this relationship has the potential to guide land management practices that balance agricultural productivity and the conservation of both prairie dogs and insectivorous bats in the Great Plains.

Herbison N[1]; Zabinski W[1]. A CUCKOO SLUMBER PARTY? REDISCOVERY OF *NOMADA* (*PACHYNOMADA*) ASTERIS SWENK, 1913 (HYMENOPTERA: APIDAE), WITH NOTES ON UNUSUAL MALE AGGREGATORY BEHAVIOR.
[1]University of Kansas
Despite tremendous global diversity, little is known about bees in the genus *Nomada* Scopoli, 1770. The *Nomada* subgenus *Pachynomada* Rodeck, 1945 includes 14 species, all within the Nearctic region. *Nomada* (*Pachynomada*) *asteris* Swenk, 1913 is a rare Kansas native that is described from a single female specimen collected in 1908 and 12 male specimens collected in 1949. The discovery of a putatively healthy population of *N. asteris* on the outskirts of Lawrence, KS, and a second female museum specimen in the collection at the University of Kansas marks 96 years since the female and 77 years since the male have been observed. An interesting observation was made on the aggregatory roosting behavior of male *N. asteris*, and is documented here for the first time. This observation marks the first formal description of aggregatory behavior of Nomadinae. These results highlight the importance of both

observational surveys and museum specimens in the ongoing pursuit of understanding bee biology, behavior, and diversity, and signify a need for more-thorough modern survey efforts.

Huggard DT[1]; Conard JM[1]. SEED DISPERSAL BY BISON (*BOS BISON*) AND ELK (*CERVUS CANADENSIS*) IN A MIXED-GRASS PRAIRIE.
[1]Sterling College
Understanding seed dispersal in prairie systems is important but the role of large native ungulates in dispersing seeds is not well understood. Our research focuses on seed dispersal by bison and elk in a mixed grass prairie in McPherson County, Kansas. Our objectives included: 1) determining germination success of seeds consumed by bison and elk and 2) comparing carbon and nitrogen stable isotopes from pellet samples between bison and elk. We hypothesized that bison would consume mostly graminoids and have a higher rate of germination from pellets, and elk would consume a wider variety of vegetation and a lower germination rate. We collected 30 samples each of bison and elk pellets from Maxwell Wildlife Refuge in November 2025. We cold-stratified pellets for 45 days to break seed dormancy. Following stratification, we crumbled pellets into equal portions and planted them in trays, set under grow lights and heat mats, then waited for germination. We separated 1g of each sample to be air-dried and submitted for carbon and nitrogen stable isotope testing. Average carbon stable isotope values (σ13C) for bison were -18.93‰ and the average for elk was -28.30‰. Average nitrogen stable isotope values (σ15N) for bison were 0.18‰ and the average for elk was 0.35‰. Bison consumed mainly C4 vegetation and had a higher percentage of pellets that germinated. Elk consumed a wider range of vegetation and had a lower percentage of germination. From these results. We can conclude that bison and elk both effectively disperse seeds. Bison are more selective about what they eat and consume primarily grasses. While selective grazing by bison may reduce biomass of native grasses and increase plant diversity, they may also serve as effective dispersers of grass species.

Kampshoff MB[1]; Hentschinski M[2]. ENTANGLEMENT ENTROPY IN PARTICLE COLLISIONS.
[1]University of Kansas; [2]Universidad de las Americas Puebla
We discuss the introduction of measurements of entanglement entropy to collider physics. The study of entanglement entropy, a measure for correlations between observed and unobserved subsystems in an experiment, is emerging across a wide range of applications, from black holes to quantum computing. In recent years, it is also gaining interest in evaluating collisions at particle accelerators like the LHC, with the hope of shining light onto processes that are inaccessible to direct measurement. We present a motivation for this application, and scenarios in which it may prove useful beyond our current measurement methods, as well as arising problems.

Kessen CM[1]; Baum KA[1]; Gonzalez VH[1]. RELATIONSHIPS BETWEEN PHYSIOLOGICAL TRAITS AND CRITICAL THERMAL LIMITS IN A COMMON KANSAN BUTTERFLY.
[1]University of Kansas
Insects are ectotherms susceptible to changing global temperatures. Critical thermal limits (CTLs) are the minimum and maximum temperatures at which an insect becomes unresponsive and represent their response to temperature extremes. CTLs can be affected by physiological and environmental factors, like body size and thermal history, though species and age effects remain understudied. In this study we examined how body size and age affected CTLs of the variegated fritillary butterfly (*Euptoieta claudia*), a pollinator, when thermal history was constant. We hypothesized that younger and larger individuals would be more tolerant than older and smaller individuals, respectively. Individuals were reared/kept under a 25 °C/23 °C daily temperature cycle until trial. Adult CTLs were assessed by increasing or decreasing temperature by 0.5 °C/min until the butterfly became unresponsive. CTmin was tested before CTmax, with an hour of recovery at room temperature between trials. Variegated fritillaries are sexually dimorphic with larger females than males ($p < 0.001$), however, sex and body mass had no effect on CTmin or CTmax. Age also did not affect CTmax or CTmin, suggesting CTLs could be constant among individuals of similar thermal history, irrespective of physiological traits. This suggests that individuals with similar thermal history will respond similarly to extreme temperature events. Future research will evaluate whether variable thermal history influences behavioral responses to temperature extremes under natural or semi-natural conditions to provide additional context for insect thermal tolerance in the face of changing environments.

Laser OM[1]; Miller KE[1]; Beard KC[1]. PANTOWHO? IDENTIFICATION OF A NEW GENUS OF LATE PALEOCENE PANTODONT AND A REASSEMENT OF PANTODONT PHYLOGENY
[1]University of Kansas
The Black Peaks Formation (BPF) of Big Bend National Park, Texas samples the southernmost Paleocene fossil vertebrate localities in North America. Two main localities (Ray's and Joe's Bonebeds) within the formation have yielded a diversity of fossil mammals including multituberculates, condylarths, and pantodonts. The order Pantodonta represents the earliest radiation of large-bodied placental mammals following the Cretaceous–Paleogene mass extinction. Evolutionary relationships within Pantodonta remain poorly resolved as conflicting classifications and uncertain species identifications obscure patterns of early pantodont diversification. Here, we present the identification of a new genus of pantodont from the Ray's Bonebed locality (~60.5 Ma) and provide the first comprehensive phylogenetic analysis of Paleocene Pantodonta, elucidating the early evolutionary and biogeographical history of the order. A character-taxon matrix of 54 craniodental characters was scored for 14 taxa including North American, South American, and Asian pantodonts. Morphological data were collected by examining pantodont specimens from the University of Kansas Museum of Natural History, the Chicago Field Museum, the Louisiana State University Museum of Natural History, and published datasets. Preliminary results from a parsimony analysis suggest the BPF taxon is nested within the family Pantolambdidae, an early North American clade known primarily from

the Paleocene, with a recent addition described from China. It is well-evidenced that many Paleocene mammals dispersed from Asia through Beringia, but the oldest and most basal members of North American pantodonts occur within the southernmost localities. Furthermore, the oldest pantodont found within the western hemisphere, *Alcidedorbignya inopinata*, is known only from Bolivia. The BPF taxon provides more evidence for the discrepancy between accepted Paleocene mammal dispersal and the patterns observed within western hemisphere Pantodonta. By combining updated morphological datasets with modern phylogenetic methods, this research provides the first comprehensive assessment of pantodont evolutionary relationships in over sixty years. The clarification of pantodont phylogeny will provide an improved understanding of the diversification and dispersal of early placental mammals.

Miller KE[1]; Beard KC[1]. NEW MICROSYOPIDS (MAMMALIA:PRIMATOMORPHA) FROM THE LATE PALEOCENE OF TEXAS AND WYOMING ILLUMINATE THE EARLY EVOLUTIONARY HISTORY OF THE FAMILY.
[1]University of Kansas Biodiversity Institute
Plesiadapiforms are an extinct, paraphyletic group of basal primatomorphans. Surviving for ~20 Ma during the early Cenozoic, Microsyopidae is the second longest lived of any plesiadapiform family. Microsyopids are commonly known from the Rocky Mountain region of North America but have also been recovered from Eocene strata in California and Mississippi. Navajovius sp. has previously been reported from the Black Peaks Formation (BPF) of Big Bend National Park, Texas. However, a new occurrence of *Arctodontomys* in the BPF extends the geographic range of this genus southward to the USA-Mexico border and its temporal range back into the middle Tiffanian (Ti3). While microsyopids have previously been reported from southern Wyoming, new specimens from the Big Multi Quarry (BMQ, Cf1) and Twelve Mile Bonanza (TMB, Ti5) localities in Sweetwater County likely represent a new species of basal microsyopid. Here, we describe new microsyopid taxa from Big Bend National Park and southern Wyoming and present the first comprehensive phylogenetic analysis of North American Microsyopidae. A parsimony analysis of 70 characters scored for 26 taxa was performed using TNT. Results ally the BPF *Arctodontomys* sp. with *A. simplicidens*. The taxon originally assigned to the genus *Navajovius* was recovered as a basal member of the Uintasoricinae. The taxon from BMQ and TMB is allied with *N. kohlhaasae* near the base of the microsyopid tree. The presence of a basal microsyopid and *Arctodontomys* in Texas during the middle Tiffanian, ~3 Ma before their appearance in more northern localities, suggests that southern North America was an important epicenter of the early microsyopid radiation.

Muniu PN[1]; Agusto FB[1]. EXPLORING SPATIO-TEMPORAL TRENDS AND CLUSTERS OF MENTAL HEALTH DURING COVID-19 IN THE GREAT PLAINS AND ROCKY MOUNTAIN REGIONS.
[1]University of Kansas
Mental health disparities remain a persistent public health concern in the United States, particularly in rural and geographically isolated regions such as the Great Plains and Rocky Mountains where access to care is limited. The COVID-19 pandemic may have intensified these

disparities by exacerbating socioeconomic stressors and barriers to healthcare. We hypothesized that frequent mental distress (FMD) increased during the pandemic and that its drivers vary across space and time due to differences in demographic structure, socioeconomic conditions, and access to healthcare. Specifically, we predicted that counties with higher socioeconomic vulnerability and limited healthcare access would exhibit higher levels of FMD. To investigate these patterns, we analyzed county-level data on FMD from 2019–2023 across the Great Plains and Rocky Mountain regions. Spatial autocorrelation analyses were conducted to detect clustering of mental distress, and geographically and temporally weighted regression (GTWR) and multiscale geographically and temporally weighted regression (MGTWR) were used to quantify spatial and temporal variation in relationships between FMD and socio-demographic predictors including race, gender, age distribution, household income, unemployment, rural population, and healthcare access. Results revealed substantial spatial heterogeneity in mental distress across the study area. Race, gender, income, and age structure were consistently associated with variations in FMD, while the effects of unemployment, rural population, and healthcare access varied significantly across counties and over time. Persistent clusters of high FMD were identified in Kansas, Nebraska, Oklahoma, and Texas, while counties in North Dakota, Wyoming, and Montana consistently exhibited lower levels of distress. These findings highlight pronounced spatial and temporal inequalities in mental health across the Great Plains and Rocky Mountains and underscore the importance of geographically targeted mental health interventions and resource allocation.

Nelson E[1]; Merrill T[1]; Opichka O[2]; Roeder DV[1]. MICROCLIMATE MATTERS: INFLUENCE OF ENVVIRONMENT ON NATIVE AND NON-NATIVE ANT FORAGING.
[1]Augustana University; [2]University of Sioux Falls
Increasing global temperatures and variability in weather patterns are expected to significantly affect the distribution, persistence, and behavior of a wide range of species, particularly for ectotherms that rely on the environment to regulate body temperature. Urban areas impose different microclimate conditions than the surrounding environment via the urban heat islands effect, as well as through human land use and manicuring. We evaluated foraging activity and microclimate associations in two of the most abundant mass-recruiting ant species in Sioux Falls, SD, the native *Lasius neoniger* and the invasive *Tetramorium immigrans*. During summer 2025, we measured foraging activity and microclimate across 5 sites and 25 transects, each measured 15 times at different times of day. We found that *L. neoniger* foraging recruitment to baits declined with increasing soil and surface temperatures, increasing light intensity, and declining humidity. In contrast, *T. immigrans* did not seem to be limited by any of the microclimate variables we measured. Both species recruited en masse to baits within the same transect, although baits with one species typically did not also contain the other species. This lack of limitation during the summer when food is most available may shed some light on how *T. immigrans* from the Mediterranean has become so successful in the variable climate of the Midwestern US–by colonizing cities and taking advantage of resource-rich summers by mass recruitment to food resources.

Patrick LE[1]. BUILD A MAMMAL BATTLES: BEYOND EXAMS IN MAMMALOGY.
[1]Fort Hays State University and Sternberg Museum of Natural History
Calls to action have led many instructors to revise their teaching methods to be more active, inclusive, and better reflect the process of science. However, high-stakes written and practical exams are still the most commonly used methods to assess student learning. Traditional exams often neglect assessment of skills other than memorization and can reflect a misalignment between learning outcomes and assessment methods. In an effort to better align my assessments with my learning outcomes and teaching methods, I replaced traditional lecture exams with a creative project in my mammalogy course. For this project, students "design" or "build" a fictional mammal over the course of the semester, giving it traits and characteristics based on the content we cover in each module. At the end of the semester, students virtually "battle" their creations in matches that combine elements of March Mammal Madness and Dungeons and Dragons. Over two iterations of this "exam" style in the course, students report nearly universal enjoyment of the project, reduced stress associated with exams, and increased content knowledge. This style of assessment should translate seamlessly to a variety of organismal biology courses.

Quezada A[1]; Nuñez-Penichet C[2,3]; Soberón J[1,2]. BUTTERFLY RECORDS IN KANSAS: CONTRIBUTIONS FROM MUSEUM COLLECTIONS.
[1]Department of Ecology & Evolutionary Biology, University of Kansas; [2]Biodiversity Institute, University of Kansas; [3]Fish and Wildlife Conservation Department, Virginia Tech
Access to online biodiversity data has become increasingly common; however, digital records represent only a fraction of all available information. By analyzing butterfly distributions, biodiversity hotspots, and temporal trends across Kansas using only digitized and openly available data, we identified significant gaps in both historical periods and geographic coverage. To explore the potential causes of these gaps, we visited several museum collections across the state and compiled information from non-digitized specimens to create a more integrative dataset. We found that, in many cases, these gaps were not due to a lack of primary information, but rather to a lack of broadly accessible, digitized data. Our findings highlight the essential role of museum collections such as those at the Sternberg Museum of Natural History and Kansas State University, and we look forward to visiting additional collections across the state. These institutions act as irreplaceable repositories of long-term biodiversity data that are critical for understanding biodiversity composition and species distributional shifts over time. Our results also underscore the importance of investing in making museum collections broadly accessible. Although digitization is time-consuming and costly, the resulting scientific value far outweighs the institutional investment required. Moreover, having sufficient accessible data is essential for guiding fieldwork efforts aimed at comparing, corroborating, and expanding biodiversity knowledge for current and future research projects.

Rhinehart PD[1]; Beard KC[1]; Anemone RL[2]. NEW GENUS OF OMOMYID PRIMATE FROM THE EOCENE OF THE GREAT DIVIDE BASIN, WYOMING.
[1]Ecology and Evolutionary Biology and Biodiversity Institute, University of Kansas;
[2]Anthropology, University of North Carolina at Greensboro
Omomyids are a family of early extinct primates that appear suddenly in the fossil record at the beginning of the Eocene. These small-bodied primates have been classically associated with tarsiers, but the phylogenetic relationships among the family are still unresolved. The Smiley Draw local fauna is a fluvial sandstone locality group in the Great Divide Basin in southern Wyoming that produces an incredible number of high-quality fossils from the early Eocene. Among the over 5000 identified fossils at Smiley Draw are four genera of omomyid primates. Three of these omomyids belong to previously described genera: *Anemorhysis*, *Arapahovius*, and *Tetonius*. However, the last omomyid is a new genus that likely belongs to a subgroup of omomyids called Trogolemurini. Trogolemurini is a tribe that existed from the early Eocene (~53Ma) to the late Eocene (~38Ma) and included several genera and species from North America. The morphology of the tribe changes substantially from the early to late Eocene. Early members of the tribe had a primitive lower dental formula of 2-1-3-3 while by the late Eocene, the lower dental formula of *Trogolemur* was 1-1-2-3. The new genus resembles the earliest members of the tribe and shares many ancestral characteristics. However, the new genus also has several autapomorphies including a bilobed P2 root, a distinct hypoparacrista on P3-4, and mesiodistally elongated straight and tall paracristids on p3-m1. The straight and tall paracristids are of particular interest as they may represent a different diet than the frugivory most often associated with early Eocene omomyids.

Riney AD[1]. THE POTENTIAL ANTIMICROBIAL EFFECTS OF NNSN COMPOUNDS.
[1]Friends University
NNSN compounds are organic compounds that are copper activated and create antimicrobial effects by disrupting bacterial homeostasis. They do so by creating an imbalance in that bacteria's plasma membrane and the cell wall by enhancing that membrane's permeability causing it to rupture and leak. These compounds are effective in their use on antibiotic resistant bacteria, specifically gram positive bacteria. More broadly NNSN may prove to be the future of all antibiotics. The purpose of the study was to ascertain the effectiveness of nine different NNSN compounds developed by the chemistry department at Friends University. During the process, sterile blank discs were soaked in the NNSN compounds and plated onto an agar plate. The plate was inoculated with a bacterial spread containing one of five different microbes. The bacteria chosen were a mix of gram negative and gram positive bacteria as well as one fungus *Candida albicons*. The other bacteria chosen were *Pseudomonas fluorescens*, *Micrococcus luteus*, *Rhodospirillum rubrum*, *Spirillum volutans*. Five discs were placed on each plate, two of the discs were treated with two different NNSNs, two more discs were treated with those same two different NNSNs but mixed with a copper sulfate solution, and finally the last disc was soaked in water and used as a control. The bacterial plates were placed in an incubator for 24 hours before being examined for bacterial growth. The data showed that all nine of the NNSN compounds mixed with the copper solution were effective against each strain at varying levels.

These results support that these particular NNSN compounds should be further researched for future antibiotic use. These compounds could very well shape the future of the pharmaceutical industry and the production and use of antibiotics around the world.

Roeder DV[1]; Merrill T; Nelson E; Opichka O[2]. THERMAL PERFORMANCE MEDIATES FORAGING BY URBAN ANTS.
[1]Augustana University; [2]University of Sioux Falls
The composition and relative abundance of species in an assemblage arises from the match of their individual abiotic and biotic requirements to environmental availability. For ectotherms in particular, temperature exerts strong control over persistence, activity, and interactions between species. It can also present a host of challenges for species introduced into new geographic regions, as well as opportunities if those challenges can be overcome. To begin to explore theses costs and opportunities in an invaded ant assemblage in Sioux Falls, SD, we examined thermal tolerance and temperature preference of two of the most abundant ants at our field sites—the native *Lasius neoniger* and the non-native *Tetramorium immigrans*. We found that upper temperature tolerance was significantly higher in *T. immigrans*, while *L. neoniger* was able to tolerate significantly cooler temperatures. In tests of ant self-selection of resting temperature, both species avoided temperatures below 10°C, but *T. immigrans* was found resting at much warmer temperatures than *L. neoniger*. These thermal tolerances correspond to our observations of high *T. immigrans* abundance on baits in the hottest parts of the summer when *L. neoniger* was absent. We suggest that native species such a *L. neoniger* may be better suited to cold northern latitude winters, as evidenced by their lower thermal tolerance, while the invaded range of *T. immigrans* may be limited to urban heat islands. This preliminary study will inform further investigation of how *T. immigrans* interacts with invertebrate communities and the environment in the northern Great Plains.

Sytsma J[1]; Ricker A[1]; Winters H[1]; Eggleston J[1]; Johnson L[1]. CLIMATE-LINKED VARIATION IN STOMATAL TRAITS AND GAS EXCHANGE OF THE DOMINANT PRAIRIE GRASS ACROSS PRECIPITATION GRADIENTS.
[1]Kansas State University
Tallgrass prairie is one of the most threatened ecosystems in North America and is increasingly vulnerable to rising temperatures and intensifying drought. *Andropogon gerardi* (big bluestem) is a dominant perennial grass of tallgrass prairie and an important forage species for cattle production. Since this species occurs across a broad climatic range, populations may exhibit adaptation to local climate conditions that influence physiological responses to water limitation. Understanding climate–trait relationships in *A. gerardi* is therefore important for predicting prairie responses to future climate change and for informing grassland restoration and management. This study examined climate-associated variation in stomatal characteristics and gas exchange in *A. gerardi* populations originating from contrasting climates. Twenty-seven *A. gerardi* populations were collected from sites spanning broad climatic gradients in North America, ranging from 420-1510 mm yr^{-1} in mean annual precipitation and 6-21 °C in mean annual temperature. Populations were grown in a multi-site transplant experiment established

across four locations distributed along a precipitation gradient (510–1140 mm yr^{-1}). Within these common gardens, we quantified stomatal size and density using leaf epidermal impressions and light microscopy and measured leaf gas exchange traits using LICOR-6400. Specifically, we asked (1) does variation in stomatal size, stomatal density, and gas exchange traits relate to climate of origin, and (2) how climatic history influences responses to altered rainfall conditions. We hypothesized that populations originating from drier climates would exhibit smaller stomata, higher stomatal density, and increased water use efficiency compared to populations from wet sites. We further predicted that populations from wetter climates would show larger increases in stomatal density but stronger declines in gas exchange under reduced soil moisture compared to those from drier climates. Variation in stomatal morphology and gas exchange traits was associated with precipitation and aridity at the populations' home sites. Populations originating from drier environments exhibited smaller stomata and adjustments in stomatal density consistent with conservative water-use strategies. These dry populations also showed increased water use efficiency at all sites compared with populations from wetter climates, suggesting greater tolerance to water limitation. In contrast, populations from wetter regions showed larger, less dense stomata and were more sensitive to soil moisture reduction. Together, these patterns support the hypothesis that climatic history contributes to physiological differentiation among populations of this widespread prairie grass. Our findings highlight the role of climate-linked variation in stomatal traits and physiological performance in shaping drought responses of *A. gerardi*. Since stomatal characteristics influence plant water use and carbon uptake, population-level differences in these traits may have important implications for grassland productivity and resilience under future droughts. These findings therefore help guide restoration and management strategies by informing the selection of plant populations best suited for future climatic conditions in tallgrass prairie ecosystems.

Velazquez Corral JA[1]. FROM THE BUILDING BLOCKS OF MATTER TO THE EARLY UNIVERSE.
[1]The University of Kansas
How did the matter that makes up our universe form right after the Big Bang? To find out, physicists at CERN smash heavy ions (atoms) together to create temperatures much hotter than the sun. This extreme heat melts protons and neutrons into an exotic primordial soup called a quark-gluon plasma. In this talk, I will explain how these massive experiments work and how studying this unique "soup" helps us understand the origin of everything around us.

Walters JR[1]; Sanderson B; Plakke M[2]. SINGLE-NUCLEUS RNA-SEQ ANALYSIS OF DICHOTOMOUS SPERMATOGENESIS IN SILKMOTH, *BOMBYX MORI*.
[1]University of Kansas; [2]Governors State University
Like in most lepidopteran species, males of the silkmoth (*Bombyx mori*) produce two distinct sperm morphs: fertilizing eupyrene sperm and non-fertilizing apyrene sperm. Apyrene sperm lack a nucleus and nuclear DNA, but are nonetheless essential for successful fertilization of ova. The molecular genetic basis governing this developmental process of dichotomous spermatogenesis remains enigmatic. Currently, only a few genes are known to differentially

impact the development of the two sperm morphs. With the aim of broadly surveying the differences in gene expression associated with eupyrene versus apyrene spermatogenesis, we generated single-nucleus RNA-sequencing data from testes isolated from 5th instar larvae and 4-day old pupae. Since the transition from eupyrene to apyrene spermatogenesis occurs during pupation, these samples should capture transcriptional differences occurring between the two sperm morphs. Comparative analysis with *Drosophila melanogaster* allowed us to identify cell clusters corresponding to major cell type in spermatogenesis (e.g. spermatogonia, spermatocyte, spermatid, etc.), as well as several other testes-associated somatic cell types. We identified two distinct sets of cell clusters reflecting developmental trajectories corresponding to apyrene and eupyrene spermatogenesis. We identified >1000 genes differentially expressed between apyrene and eupyrene spermatogenesis. Notably, previous microscopic investigations suggest a major difference between apyrene versus eupyrene spermatogenesis in the role of the synaptonemal complex, but differential expression analyses between cell clusters do not support this hypothesis.

Westermann Salas L[1]; Andrews RM[1]; Moyle RG[1]. PHYLOGENOMICS OF SOLOMON ISLAND FLYCATCHERS REVEAL COMPLEX EVOLUTIONARY RELATIONSHIPS WITHIN GENUS.
[1]University of Kansas, Biodiversity Institute
Speciation is one of the fundamental evolutionary processes that generate the immense biodiversity we observe on our planet. Despite being ubiquitous across the tree of life, it is not fully understood across all taxa. Island systems have historically been used to investigate biogeography and speciation due to their isolation and potential for rapid species diversification. For instance, monarch flycatchers (Aves: Monarchidae) have been used to study the origin of avifauna across Pacific islands. Despite this, previous phylogenetic work on this family is limited, based on restricted sampling and few loci. One such genus is *Monarcha*, comprised of several species native to the Solomon Islands. Here, we use genomic data and comprehensive sampling of the Northern Melanesian *Monarcha* to disentangle the phylogenetic relationships within the genus and clarify its evolutionary history. We identified single nucleotide polymorphisms (SNPs) and used those as a basis for a variety of phylogenetic and population genetic analyses. Our analyses reveal a well-supported species-level topology that renders *Monarcha castaneiventris* paraphyletic. Additionally, we uncover evidence of gene flow between *M. castaneiventris* and both *M. richardsii* and the more widespread *M. cinerascens*. Our data also reveals possible species-level divergence of *M. castaneiventris megarhynchus*, which is found on the deeply isolated southernmost island of Makira and surrounding small islands. These findings highlight the need for taxonomic revision within this clade. More broadly, these results clarify where members of the *Monarcha* genus fall within the speciation continuum, adding to the growing body of literature showcasing the complex evolutionary relationships of taxa diversifying within island systems.

Wuellner CT[1]. UNLOCKING SCIENCE'S ACCESSABILITY, INFLUENCING SCIENTIFIC LITERACY, AND FOSTERING POSITIVE PERCEPTIONS OF SCIENCE IN THE PUBLIC THROUGH ART: AN EXPERIMENT CULMINATING IN A DYNAMIC, COLLABORATIVE, EDUCATIONAL ART INSTALLATION AND SCIENCE EXHIBIT

[1]University of Texas, Texas Science & Natural History Museum

Using art as the means for introducing scientific ideas is an excellent way to raise the public's acceptance of science. In this talk I will enumerate how a creative, art-focused project had a positive impact on participants' perception of science. My project, "Follow the Monarchs," provided hundreds of participants (the public) with a rewarding and creative experience: they used my tutorial to draw a monarch butterfly from scratch, and donated it to be part of an art installation housed in the Texas Science & Natural History Museum, University of Texas, Austin. The art installation depicts overwintering monarch butterflies in the Sierra Madre Mountains of central Mexico, roosting on branches of the oyamel fir tree. Monarch butterfly natural history is well-studied and rich with opportunities to explore adaptation, sexual selection, insect behavior, and the scientific method. Most participants would not have considered themselves artists, but they were willing to draw a complex insect. Similarly, most participants would not have been interested in a science lecture, but being in this creative mindset made the introduction of complex scientific ideas more conversational than lecture-like. Participants' attitudes toward science ("What they had learned") were notably positive. The link between tapping the creative mind and increased critical thinking in students is known among educators (Saad 2024). As participants drew, their pace slowed, their focus increased, and they often spoke of experiencing "flow" during the process. In this ideal learning atmosphere, I introduced science, which was well-received. This project supported in part by the City of Austin's Office of Arts, Culture, & Entertainment.

Zhou Y[1]; Bever J[1]; Wagner M[1]. A LONG-TERM GREENHOUSE EXPERIMENT REVEALS STRONGER NEGATIVE PLANT–SOIL FEEDBACK BETWEEN DIFFERENT PLANT FAMILIES BUT NO EFFECT OF PERENNIALITY.

[1]University of Kansas

Plant-soil feedback can influence plant community structure with negative feedback being a mechanism contributing to plant species coexistence. Negative plant-soil feedback has been shown to be particularly important for native plant communities such as prairies. How feedback effects are distributed across plant families and life histories may shape community dynamics and patterns of diversity. In particular, whether plant life history significantly influences feedback direction remains unresolved. Here, we test feedback between plant species differing in family (Asteraceae/Poaceae /Fabaceae) and life history (annual/perennial). We conducted a full factorial greenhouse test experiment using six plant species and soil trained by these plant species for three years. Initial soil microbial inoculum consisted of pooled soils collected from sites with varying land-use histories (agriculture, restored farmland, and remnant prairie) in Kansas. During the training phase, annual plants were replanted annually in the same pots, whereas perennial plants overwintered naturally. In the feedback phase, plants were grown for approximately two months. Whole plants were harvested when annuals reached early flowering,

and total biomass (above- and belowground) was measured. Productivity was analyzed using general linear models in SAS. Feedback coefficients were calculated from marginal means and analyzed using the "metafor" package in R. Plant productivity varied significantly among plant species ($F_{5,150} = 66.82$, $p < 0.0001$) and among soil inoculum treatments ($F_{5,150} = 18.06$, $p < 0.0001$), with a significant plant × soil interaction ($F_{25,150} = 1.89$, $p = 0.0107$). Pairwise feedback coefficients (Is) were calculated from this interaction. Life history did not significantly predict feedback effects ($QM(2) = 1.49$, $p = 0.474$), although perennial species pairs tended to exhibit negative feedback. In contrast, phylogenetic grouping significantly explained variation in feedback ($QM(3) = 8.33$, $p = 0.040$). Species pairs from the same family predominantly exhibited positive feedback, whereas feedback between species from different families was generally negative. Asteraceae and Poaceae species showed more negative feedback than Fabaceae species. These results suggest that soil microbial dynamics may promote coexistence among plant species from different families, leading to greater phylogenetic diversity. Ongoing analyses are examining which microbial groups contribute to these feedback patterns.

POSTER PRESENTATION ABSTRACTS (FIRST AUTHOR PRESENTER)

Aber JS[1]; Aber SEW. HYDROPHYTE BLOOMS AT CHEYENNE BOTTOMS PRESERVE IN BARTON COUNTY, CENTRAL KANSAS.
[1]Emporia State University
Cheyenne Bottoms Preserve is operated by The Nature Conservancy (TNC). The preserve is a wetland complex that covers more than 3200 ha (>8000 acres) in the upstream (northern and western) portions of the Cheyenne Bottoms depression. It includes the deltas of Blood Creek and Deception Creek as well as numerous pools, mudflats, marsh, and prairie environments. TNC makes no attempt to control water levels on the preserve, which is managed for shorebirds and grassland birds as well as waterfowl. As a consequence of this management approach, flood and drought cycles take place frequently. We have conducted kite aerial photography and ground observations during the growing season every year since 2002 in order to document rapid changes in water levels, vegetation cover, plant species, and soil conditions. Unexpected hydrophyte blooms may take place during transitions, especially following floods. A bloom of mosquito fern (*Azolla* sp.) took place in 2009;a similar bloom of duckweed (*Lemna minor*) happened in 2020. Water smartweed (*Polygonum amphibium*) expanded dramatically in the spring of 2025. This bloom proved to be short lived, as continued rain led to flooding of the pool-marsh complex. Other emergent plants, including *Phragmites*, became well established by late summer 2025, and by autumn an algal bloom was quite apparent. Under the passive management scheme at Cheyenne Bottoms Preserve, fleeting environmental conditions may arise, so vegetation is always in a state of flux. Ephemeral plant communities come and go, but the wetland environment perseveres.

Agunbiade O[1]; Orellana KS[2]; Franz N[2]. DESIGNING A MODERN WORKFLOW FOR DIGITIZING AND PUBLISHING INSECT RESEARCH COLLECTION DATA AND IMAGES: THE EXAMPLE OF NAUPACTINI WEEVILS (COLEOPTERA: CURCULIONIDAE) IN THE KU ENTOMOLOGICAL COLLECTION.
[1]University of Kansas Museum Studies Program; [2]University of Kansas Biodiversity Institute
Biological specimens housed in natural history museums document global biodiversity across space and time and provide information for advancing scientific research. Historically, access to these collections has been limited to researchers with resources to access collections in-person, thereby creating barriers for novel research and data reusability. Standard-based digitization efforts across international natural history aim to remove these barriers by transforming physical specimens and their associated data into accessible and usable digital resources for global research communities. The Entomological Collection of the University of Kansas Biodiversity Institute & Natural History Museum (KUNHM) holds approximately 4.9 million pinned and labeled specimens. With more than 1.4 million digitized specimens, it is the largest insect collection dataset in the United States and the third largest published in the world. In this project, we advanced the digitization of weevils (Insecta: Coleoptera: Curculionidae) in the tribe Naupactini. This group is part of the undigitized portion of the KUNHM Entomological Collection. The KUNHM Naupactini weevil holdings include specimens dating back nearly 100

years and current accessions. These specimens provide valuable data signals to address questions about how species evolved, temporal changes in distribution, and the impacts of environmental change. This project documents the digitization workflow which includes specimen re-curation, electronic data capture using the Specify 7 platform, specimen imaging, georeferencing of locality data, and data publishing through biodiversity data aggregators such as the Global Biological Information Facility (GBIF) and Symbiota portals. Digitizing the primarily Neotropical Naupactini weevils is relevant to agriculture as several species are known to feed on cultivated food plants. This effort will also improve specimen and data preservation by reducing the need for future physical handling and increasing global data access for this diverse group of weevils.

Amego KS[1]; Norton AE1; Liu X[1,2]; Chen M-S[1,2]; Whitworth RJ[1]. EFFICACY OF CONVENTIONAL NEONICOTINOID AND CARBON NANOTUBE–BASED SEED TREATMENTS AGAINST THE HESSIAN FLY

[1]Kansas State University; [2]USDA-ARS

The Hessian fly (*Mayetiola destructor* [Say]) is a significant pest of wheat that can cause significant yield losses. Traditional management strategies include planting resistant varieties, destroying volunteer wheat, delaying planting, and using insecticide-treated seeds. However, each strategy presents noteworthy limitations. Resistant wheat varieties often have lower yields than susceptible varieties. These varieties can be affected by increased temperatures. Warmer early winter conditions extend the activity of adult Hessian flies (HF) into the fall. As a result, delayed planting is less effective. Although conventional neonicotinoid seed treatments suppress early fall infestations, the efficacy of current seed treatments only lasts about 30 days after planting. The objective of the present study was to assess the current efficacy of neonicotinoid wheat seed treatments in controlling HF infestations. The study also compared the efficacy of seed treatments made of carbon nanotubes and neonicotinoids with conventional neonicotinoid insecticides applied at the commercial rate. We hypothesized that seed treatments made with carbon nanotubes and neonicotinoids, even at a lower rate, could improve the control of Hessian fly compared to conventional neonicotinoids at commercial rates. To test this, we reassessed the efficacy of two conventional neonicotinoid seed treatments, including thiamethoxam at a commercial rate of 0.013 mg active ingredient (ai) per seed and imidacloprid at a commercial rate of 2.9 ml ai per 5 lbs. of seed, in the laboratory. Furthermore, the efficacy of carbon nano-imidacloprid seed treatments was assessed in both laboratory and field settings at the commercially recommended rate of 2.9 ml per 5 lbs. of seed and at half that rate of 1.45 ml per 5 lbs. of seed. In the laboratory experiment of the conventional insecticide, the thiamethoxam-treated seeds provided nearly optimal control of the Hessian fly infestation, with infestation levels remaining close to zero for up to 30 days after planting. The efficacy of the imidacloprid-treated seeds was moderate, with infestation levels varying between 30% and 60% within the same period. For the experiment comparing carbon nano-formulation to the imidacloprid seed treatment, carbon nano-imidacloprid, applied at the high commercial rate, was the most effective treatment overall, providing the lowest infestation levels in both laboratory and field experiments. The nano-imidacloprid treatment at half the commercial rate was less effective than

the full-rate nano treatment but performed similarly to the conventional imidacloprid seed treatment. These results support the hypothesis that nano-formulated insecticide seed treatments can demonstrate equivalent or enhanced efficacy compared to conventional neonicotinoid insecticides and may maintain efficacy at reduced rates. Our findings show that nano-formulation-based insecticides are a promising alternative method for managing Hessian fly in wheat. These treatments could help extend the effective duration and efficacy of insecticide-active ingredients when used even at lower rates.

Aponte S[1]; Bryant M[1]; Choriego R[1]; Harmon K[1]; Haynes T [1]; Montoya E [1]; Starks T[2]; Waters R[2]; Jurcak-Detter A[1]. GROW THOSE MUSSELS: A STUDY OF SIZE CLASS AND FRESHWATER MUSSEL GROWTH IN COWSKIN CREEK IN WICHITA KS.
[1]Friends University; [2]Kansas Department of Wildlife and Parks
In North America, freshwater mussels rank among the most threatened groups of organisms. Similarly in Kansas, mussels have been declining in their abundance and distribution. The purpose of this study was to continue to monitor a population of mussels in Cowskin Creek in Wichita Kansas. While previous work has assessed the species abundances, this study also examined growth and size class distribution of the mussel population. Mussels were collected in Fall 2024 and Fall 2025 using tactile search methods. When mussels were found, data collected included the species, the height, the length, the width, if tagged, and the coordinates they were found at. Untagged mussels were tagged, previously tagged mussels were remeasured, and both were returned to their sampled location in the stream. Size class distributions were similar from the previous year for some species, while others differed. Future research should continue to monitor the abundance and size distribution to better understand future growth and recruitment.

Barnes AN[1]. PRELIMINARY OBSERVATIONAL STUDY OF MORTALITY RATES OF SENILE DEGENERATION OF THE BRAIN VS. EDUCATION LEVEL.
[1]Udall High School
Neurodegenerative brain diseases date back to the early 20th century, devastating families, friends, and communities, with the earliest recorded case being Alzheimer's in 1908. Neurodegenerative brain diseases include Amyotrophic Lateral Sclerosis (ALS), Huntington's, Dementia, Parkinsons, and many more. Over 15% of the population has developed a neurodegenerative disease, which is roughly 1.25 billion people (Van Schependom and D'haeseleer). Due to these staggering numbers, this preliminary observational study aims to answer the question: "How do mortality rates from degenerative brain diseases differ based on education level?" Data for this study was sourced from the Centers for Disease Control and Prevention (CDC) WONDER Online Database. To analyze how education level affects mortality rates from neurodegeneration, the independent variable, education level, is changed throughout the study to allow proper comparison. Results from CDC WONDER's database indicates that 0.06% of people with a master's or professional degree, 0.07% of those with an Associate's or Bachelor's degree (this also includes those with some college credit, but no degree), and 0.13% of individuals with a high school degree or less have developed and passed away from a

neurodegenerative brain disease. This preliminary observational study suggests a correlation between level of education and the development of neurodegenerative brain diseases.

Besson S[1]; Bricker JWM[1]; Rudnick G[2]; Fairchild JM[1]. STAR FORMATION AND GAS CONTENT IN VIRGO GALAXIES.
[1]Lawrence High School; [2]University of Kansas
Galaxies contain stars, dust, and gas. This study focuses on the amount of gas found in a galaxy compared to how many stars are forming in ~5000 galaxies in and around the Virgo Cluster. Data for the study comes from a variety of sources including: ultraviolet-optical-near infrared data come from GALEX satellite, the DESI Legacy Imaging Surveys, and the WISE satellite, respectively;neutral hydrogen and molecular gas measurements are a mix of archival data and those taken by the Virgo Filament Survey team;colors, stellar masses, and star formation rates were released in Castignani et al. (2022b) and the gas masses were released in Castignani et al. (2022a). Results show that galaxies with a low gas mass to stellar mass ratio have a below average star formation rate compared to galaxies of similar stellar mass. Whereas a high molecular hydrogen to atomic hydrogen ratio within a galaxy correlates with a low star formation rate.

Beydler F[1]; Morris ER[1]. INVESTIGATING THE PERIOD GENE IN PERIODICAL CICADAS (*MAGICICADA SEPTENDECULA*).
[1]Baker University
Periodicity is seen in a very limited number of organisms, including the seven species of periodical cicadas (*Magicicada* sp.) found in North America. Theories suggest this shift from annual emergence to 13- or 17- year cycles may be due to predator avoidance or environmental changes. However, the underlying molecular mechanisms that control this periodicity are unknown. Circadian clock genes have been studied in model species, but not in periodical cicadas. Working together, numerous clock genes regulate transcription, the circadian rhythm, and development. It is possible that these genes may play a role in periodicity. In *Drosophila melanogaster* the period gene (*per*) encodes a transcription regulator and plays an important role in the circadian rhythm. The per gene of Drosophila melanogaster is fairly conserved among other species of *Drosophila* and was used to create a BLASTN alignment with an unannotated *M. septendecula* genome as a reference genome. Insect species with a known or predicted per gene were also used to potentially identify per in the *M. septendecula* genome sequence. Insects within the Hemiptera order were used to create a phylogenetic tree to establish possible patterns in the evolution of per sequences. Sequences from the per genes suggest that period in *M. septenducla* could be 150,000 bp in length, which is much longer than other species of insects. Our findings were inconclusive as to defining the *M. septenducla* per gene, but our findings offer a first step in investigating the clock genes of a periodical organism.

Choriego R[1]; Haynes T[1]; Aponte S[1]; Bryant M[1]; Harmon K[1]; Montoya E[1]; Starks T[2]; Waters R[2]; Jurcak-Detter A[1]. BIVALVES IN THE CITY PART 2: A STUDY OF FRESHWATER MUSSELS IN COWSKIN CREEK IN WICHITA KANSAS.
[1]Friends University; [2]Kansas Department of Wildlife and Parks
Freshwater mussels are considered to be one of the most imperiled groups of organisms in North America. In Kansas, there has been a decline in the abundance and distribution of freshwater mussel species. The purpose of this study was to resample the mussel population in Cowskin Creek, an urban stream that flows through Wichita, Kansas. This site was sampled in 2024 and mussels were individually tagged using hallprint tags. Mussels were resampled in 2025 using tactile search methods. When mussels were found, data collected included the species, the height, the length, the width, if tagged, and the coordinates they were found at. Untagged mussels were tagged, previously tagged mussels were remeasured, and both were returned to their location in the creek. Data in 2025 showed a decrease in the total number of mussels found and a decrease in species richness (6 vs 7). Both live and dead tagged mussels were found from the previous year. Future research is needed to fully understand the trends in the population numbers, survival rate, and the species fitness.

Corona A[1]; Wolfe C[1]; Wagner PG[1]; Mercader RJ[1]. DIFFERENTIAL BREAKDOWN OF MICROPLASTICS AMONGST THREE PRIMARILY PLANT EATING INSECT SPECIES.
[1]Washburn University
Microplastics have been detected in most terrestrial ecosystems, but we do not fully understand how organisms within communities affect the breakdown of these particles. Some generalist insect species, such as tropical house crickets (*Gryllodes sigillatus*), have been shown to pulverize microplastics. We were interested in seeing if generalist insect species with different gut structures could also pulverize microplastics. Lepidopteran larvae (caterpillars) are prolific consumers of plant material with a different anatomical gut structure compared to crickets; namely their proventriculus is less sclerotized. We contrasted the fate of fluorescent polyethylene microspheres in the guts of crickets to those of a generalist caterpillar (*Vanessa cardui*) and an unrelated species that also possess a highly sclerotized proventriculus, dubia cockroach (*Blapatica dubia*). To accomplish this, we fed each species diets containing 2.5% microspheres by weight. All three species were fed a soft diet, formulated for *V. cardui*. *G. sigillatus* and *B. dubia* were also fed a hard diet formulated for both species. Our results indicate *G. sigillatus* and *B. dubia* both pulverized microplastics, but *G. sigillatus* broke down the microspheres at a lower level in the soft diet. In contrast, *V. cardui* had a very limited impact on the microplastics that passed through their guts. These results highlight considerable differences in the breakdown of microplastics amongst different insect species and diets.

Dexter LC[1]; Chitwood M[1]; Diaz Hernandez C[1]; Hernandez S[1]; Von Der Heyde TK[1]; Osborn R[1]; Falin Z[1]; Franz N[1]; Gonzalez V[1]; Orellana KS[1]. UNDERGRADUATE RESEARCH EXPERIENCES, KU ENTOMOLOGY COLLECTION.
[1]University of Kansas
The entomology collection at KU is one of the largest in North America, containing ~4.8 million species. As a result of the size of the collection, much of the content of the collections has been unprocessed or otherwise ignored. Until now. In 2026, KU Entomology collections started an undergrad research assistantship to allow KU students to contribute to the collection work. This has included processing over 1000 specimens each, with a recent focus on material from Thailand and from the Konza Prairie in Manhattan, Kansas. The Thailand insects have been sitting around for two decades, and it is only recently that they were rehydrated to be mounted/pinned, so they have required a lot of extra care. To complete this project, we will also need to label and digitize the specimens as well. Students have learned how to complete nearly every step of the workflow, barring insect collection, from mounting to barcoding to digitizing. This has also involved updating scientific classification within the collection and including new digital records of insects in Kansas within the database. The collection has not only a variety of physical specimens but also has a lot of associated data. This data contributes to various biodiversity data portals that make it publicly available. Students have learned to not only digitize data but also image, edit and upload backlogged data to the portals. The broader accessibility of this data contributes to broadening accessibility in the entomology field for anyone. These efforts promote the outreach of science communication of biodiversity not only for the scientific community but also the broader public.

Foster EF; Coole TC[2]; Neff RN[3]; Wilson DW[3]; Cornish CMC[1]; Cain BC[1]; Frazier CF[4]; Hamersky MH[5]; Harris TD[1]. MONITORING MARY'S LAKE WATER QUALITY POST 2024 RESTORATION.
[1]Kansas Biological Survey; [2]Kansas Department of Health and Environment; [3]Prairie Park Nature Center, Lawrence, KS; [4]Nevada Cooperative Fish and Wildlife Research Unit, University of Nevada Reno; [5]University of Waikato
Since its creation in the 1950s, Mary's Lake at the Prairie Park Nature Center (PPNC;Lawrence, Kansas) has served as a popular spot for recreation and education. Historically, Mary's Lake water quality has been impaired due to high nutrient loading, high pH, and low levels of dissolved oxygen near the bottom, making it difficult for sport fish to thrive. A lake restoration project was implemented in 2024, aiming to improve the lake's water quality through the removal of invasive Japanese Honeysuckle (*Lonicera japonica*) and plantings of native plants within its watershed and shoreline. We aim to compare Mary's Lake prior and post restoration water quality to determine the impact of the restoration. Mary's Lake water quality was monitored from June 2024 to November 2025. Hourly sampling occurred through the deployment of a buoy with six HOBO temperature loggers throughout the water column. Additional water quality profiles were taken monthly using a YSI ProDSS (temperature, DO, pH and turbidity) and bbe-fluroprobe (phytoplankton). We have observed that Mary's Lake retains thermal stratification during the summer with the exception of high wind days. Additionally, a

trend of low dissolved oxygen (< 2 mg/L) near the bottom and high pH at the surface (> 8) was observed during the summer (June to August) months. Nitrogen (1- ~2 ppm) and Phosphorus (~0.06 ppm) have been observed to increase during this period, but remain below EPA criteria. During July 2025, these parameters corresponded with cyanobacterial dominance. However, it is unknown whether the cyanobacteria bloom is an annual occurrence since the phytoplankton community was not monitored in 2024. Future sampling will help develop a further understanding of the impact of the restoration and cyanobacterial dominance on Mary's Lake water quality.

Frederiksen EK[1]; Baum KA[1]. ILLUMINATING POTENTIAL IMPLICATIONS OF ALAN ON MONARCH BUTTERFLY (*DANAUS PLEXIPPUS*) LIFE HISTORY.
[1]University of Kansas, Kansas Biological Survey
Artificial light at night (ALAN) is a disruptive anthropogenic phenomenon with widely recognized negative impacts on nocturnal organisms. However, little is known about ALAN's implications for organisms that are active throughout the day and night as juveniles but diurnally as adults. Using *Danaus plexippus* as a study system, we addressed questions about the effects of ALAN on key life history traits, specifically larval development rate and adult mass and size, in a migratory species. With decreasing overwintering population sizes in recent years, coinciding with habitat loss that ALAN could exacerbate, it is essential to assess whether altered light regimes disrupt these life history processes, with potential implications for migration success. To do so, we replicated ALAN-naïve and ALAN-exposed conditions in the lab. We observed larval development rate, pupal mass, adult mass, and adult wing size, traits integral to migratory success. The results of these ongoing experiments are timely, with urbanization expanding the urban-rural gradient and increasing the ubiquity of light pollution. By using a species with a changing diel rhythm, this project highlights how the effects of ALAN may change with life stage, which has important conservation implications under increasing light pollution and anthropogenic changes, especially for the migratory generation.

Friesen A[1]; Calvert R[1]. EFFECTIVENESS OF MSO, AND NON-IONIC SURFACTANTS PAIRED W/ HERBICIDES ON *EUPHORBIA ESULA*.
[1]Tabor College
Euphorbia esula, otherwise known as Leafy Spurge, is a perennial weed classified as noxious in central Montana that costs Montana landowners around 144 million dollars annually. Effective herbicide application is a vital method of noxious weed management, with surfactants playing a vital role in herbicide absorption. This study aims to compare the effectiveness of methylated seed oil (MSO) and non-ionic surfactants when paired with Opensite (aminopyralid + metsulfuron methyl) and Tordon (Picloram) herbicides. Through quadrant analysis, the efficacy of these surfactants as independent variables gives valuable insight into which surfactant is most effective on *Euphorbia esula*. The design included 10 replicated 6ft×6ft plots, divided into 4 subsections, and tested three treatments: MSO surfactant, non-ionic surfactant, and a surfactant-free control. The analysis of the results is based on percent foliar color change and was conducted from aerial images captured from a drone. Test plots feature a before-and-after picture

taken in a 9-day interval with 3 repetitions to allow proper herbicide absorption and dispersal throughout the plant. Through utilizing paired T-tests, the independent variables' effects can be analyzed and compared with the goal of highlighting outliers in data and effectively comparing 2 variables (before and after). These results have the potential to help commercial and private herbicide applicators make more informed decisions on optimal surfactant selection to ensure maximum impact on *Euphorbia esula* management. This research project combines practical agricultural management methods with up-to-date adjuvant science to aid in noxious weed species management.

Geiger E[1,2]; Ortega-Ariza D[2]; Smith R[2]. EVALUATING THE POTENTIAL OF PORTABLE X-RAY FLUORESCENCE (pXRF) ANALYSES TO DETECT CRITICAL MINERALS USING MISSISSIPPIAN CORES IN SOUTHWESTERN KANSAS: PRELIMINARY RESULTS.

[1]University of Kansas; [2]Kansas Geological Survey

This study evaluates the use of portable X-ray fluorescence (pXRF) to detect critical elements ("minerals") in Mississippian rocks from Kansas. Rock descriptions and pXRF analyses were conducted on 14 drilled cores (>4,000 ft depth) from Ness and Hodgeman counties. Most samples are Mississippian in age, with some lower Pennsylvanian rocks above the Mississippian–Pennsylvanian unconformity. Lithologies are dominated by fossiliferous limestones and dolomites, with local siliciclastics and abundant chert. Portable XRF is a rapid, non-destructive technique that measures elemental composition. A Bruker Tracer 5 pXRF was used to analyze each core at 1-ft intervals and at additional points where lithology or physical characteristics changed. The instrument detects more than 45 elements, including several on the U.S. Geological Survey critical minerals list. A silica blank and two geochemical reference materials with known compositions were analyzed to monitor contamination and evaluate instrument precision and accuracy. Preliminary results show consistent geochemical patterns linked to lithology and stratigraphy. Al, K, and Ti covary and are locally enriched near the tops of wells, likely reflecting siliciclastic input and subaerial exposure associated with the Mississippian–Pennsylvanian unconformity. Si concentrations increase in chert-rich intervals, whereas Ca dominates carbonate lithologies and commonly shows an inverse relationship with Si. Elevated Mg values reflect widespread dolomitization, and high S concentrations reliably identify pyrite. Fe–Co and Ni–Zn associations are also common. Ongoing work focuses on improving instrument calibration and identifying controls on element distribution, including type of rock, presence of fluids, and geographic variation. Future work will expand pXRF analyses to additional Pennsylvanian, Arbuckle, and Mississippian cores in eastern Kansas and integrate these data with petrophysical logs (e.g., GR, resistivity). Results will be used to evaluate pXRF as a rapid screening tool for critical elements and to map their distribution within the regional stratigraphic framework.

Grafel EB[1]; Smith DR[1]. BOOZY BEES---DO *COLLETES INAEQUALIS* BEES USE FERMENTED BROOD FOOD?

[1]University of Kansas

Solitary ground-nesting bees are important pollinators, yet many aspects of their microbial associations and nesting ecology remain poorly studied. *Colletes inaequalis* (Hymenoptera: Colletidae) is an early-season solitary bee that nests underground, constructing individual brood cells provisioned with pollen and nectar for the developing larvae. Although females dig individual nests, in suitable habitats they form nest aggregations ranging in size from fewer than ten to several hundreds or more. They nest abundantly on the University of Kansas campus, emerging in early March and beginning nests in mid-March to early April. Our goals are (1) to examine microbial agents in the brood food, and (2) to investigate factors that influence where aggregations form. (1) The larval provisions create a nutrient-rich environment that may support microbial growth, including fermentation processes. In fact, earlier observers have reported bubbles in the *Colletes* brood food, suggesting fermentation which could affect larval nutrition, preservation of provisions, or microbial interactions within the brood cell. To collect *Colletes* brood cells for examination of the brood food, we have established artificial nesting environments consisting of large containers filled with a mixture of soil and sand mimicking natural nesting conditions. These are placed near naturally occurring nest aggregations in hopes that females will voluntarily construct nests in the prepared substrate. In addition, individual female bees may be temporarily captured and confined under an inverted jar placed over the soil substrate to encourage nest initiation in the artificial environment. Once nesting occurs, brood cells will be carefully located and extracted from the substrate. Nests in the artificial nesting sites will be much easier to excavate than nests in native soil. To examine brood cells for evidence of fermentation, the pollen-nectar provisions within the brood cells will be analyzed using selective culturing to determine whether yeasts or other microbial fermenters are present. (2) Many environmental factors may affect where aggregations of native ground-nesting form, including soil texture, soil compaction, bare vs. vegetated surfaces, soil moisture, or insolation. We examined whether nest aggregations are on level or sloped ground, and if sloped, the direction the slope faces. South-facing slopes receive more sunlight than north-facing slopes, which could enable bees to emerge earlier in the spring or warm up for flight earlier in the day. Results of the microbial study are not available yet, since as of March 12, 2026, males had emerged, but mating and nesting had not begun. Although the literature on nesting biology of *Colletes* suggests that *C. inaequalis* strongly prefers south-facing slopes, we found nest aggregations on the KU campus also occurred on level ground, and on slopes facing a variety of directions.

Jaimez-Padilla NA[1]; Ortega-Ariza D[2]; Fairchild JM[1]. DEPOSITIONAL ENVIRONMENT INTERPRETATION OF MISSISSIPPIAN-AGE SUBSURFACE ROCKS FROM WESTERN KANSAS.

[1]Lawrence High School; [2]Kansas Geological Survey-University of Kansas

This study analyzes samples of Mississippian-age rocks to investigate the biodiversity and depositional environments of Kansas approximately 300 million years ago. During the Mississippian, Kansas was located in tropical latitudes at roughly 20º south and was covered by a

shallow-water sea, which provided favorable conditions for carbonate deposition. The goal of this study is to reconstruct how the depositional environment changed through time by studying the rock core and samples under microscope (thin section). Thin sections where photographed, and fossil identification was conducted systematically using point counting in the software JMicrovision. Samples were collected from the Rebecca K. Bounds (RKB) drill core in Greeley County at depths of 5,534-5,445 feet below the surface. Core samples are important for understanding subsurface geology because current knowledge is largely based on well-log surveys associated with oil and gas exploration. Core analysis provides an opportunity to ground-truth interpretations derived from well logs. Preliminary analysis shows changing abundances of fossil grains, including echinoderms, bryozoans, and bivalves. The RKB core is composed primarily of carbonate rocks that vary between coarse- and fine-grained intervals and include silica-rich zones. The abundance of echinoderm fragments, diverse fauna, and evidence of burrowing organisms suggest deposition in open, normal marine conditions. Coarse-grained lithologies indicate periods of higher-energy environments, whereas fine-grained lithologies suggest lower-energy depositional settings.

Jones, R[1]. A.S.A. H. BLACKBOARDS.
[1]Emporia State University, retired Department of Physical Science
My earliest A.s.a. H. software (Trans. Kan. Acad. Sci., vol. 109, pg. 159, 2006) was feedforward, each classifier layer of the concept hierarchy broadcasts forward (upward) its N strongest outputs to the next higher layer. More generally it is possible to employ (one or more) blackboards. In that case external inputs are sent to the blackboard as are the activated outputs of all the various classifier layers. The classifier layers all watch the blackboard for input. This allows for feedback from "higher" layers to "lower" ones. It is possible for layers to only accept the M strongest inputs that they see. Weights can be applied to all inputs to the blackboard in order to adjust how much feedback is present, to favor input from adjacent layers, etc.

Knoll LC[1]; Patrick LE[1]. POPULATION ESTIMATE AND VARIABLES ALTERING WHITETAIL DEER MOVEMENT AND ACTIVITY IN FORT LEAVENWORTH.
[1]Fort Hays State University
Fort Leavenworth Military Reservation (FLMR) is the oldest active Army post west of the Mississippi River. Situated along the Missouri River in northeast Kansas, it spans 5,927 acres and lies completely within the Glaciated Region physiographic province of Kansas. White-tail deer are of particular interest as a game species at FLMR. Surveying their population size will help inform management decisions including habitat management needs and lethal take. A trail cam survey was conducted in October, 2025. Following the methods outlined in Texas Parks and Wildlife, one trail cam was placed in each of 22 sections for ~2.5 weeks. Footage on each trail cam was downloaded separately and the animals in the footage identified manually. Total number of bucks, does, and fawns in each picture were recorded, as were the number of identifiable individuals. These were used to estimate total population size and population density. Of the 2,077 images, 356 included deer. We estimate 120 deer on base, which equates to 23.3 deer per square mile. This density estimate is likely underestimated because the cameras were

not baited. In addition, the survey occurred during bow hunting season, and many trail cams were placed within visual proximity of tree stands or blinds. Additional research is still being conducted as we investigate how the temperature and other factors correlate to deer movement with the data at Fort Leavenworth and other locations across Kansas and Oklahoma.

Liyanage RE[1]; Sikes BA[1]. PLANT–SOIL FEEDBACKS UNDER ALTERED PRECIPITATION SHAPE ABOVEGROUND TRAIT RESPONSES IN PRAIRIE PLANT SPECIES.

[1]Department of Ecology and Evolutionary Biology, University of Kansas

Plant–soil feedbacks (PSFs) play a vital role in plant community dynamics by mediating interactions among plants, soil microbes, and abiotic soil properties. New evidence suggests these feedbacks are phylogenetically structured, with negative feedbacks greater among closely related species. Precipitation shifts associated with climate change may alter soil microbial communities, plant traits, and feedbacks between them. However, the long-term impacts of precipitation-driven changes of PSFs to different plant functional traits remains poorly understood. Here, we conducted a greenhouse experiment with seventeen prairie plant species grown in soils conditioned by plant communities exposed to two different rainfall regimes. For soil training, monocultures were grown in experimental plots where plants received reduced (50% ambient) or increased (150% ambient) rainfall treatments. In the feedback test phase, individual plant species were grown in soils conditioned by their own species, closely related species (same family), or distantly related species to evaluate whether precipitation impacted plant–soil feedback responses differently across phylogenetic distance. Plant trait responses included plant height, number of leaves, chlorophyll content, stomatal conductance, and total biomass production. Trait responses were not monolithic, with biomass responses differing from those for photosynthesis (i.e., chlorophyll). Plant species also varied in their plant soil feedbacks. For Poaceae and Asteraceae species, feedbacks were often negative for self but often similar for microbes trained by plants in the same family or different families. Legumes, however, often showed the most positive feedbacks with soils trained by other Fabaceae. Precipitation effects were inconsistent among species, often acting independently from phylogenetic relatedness of training plants. Ongoing analyses will link different trait responses and tradeoffs to generalize plant–soil feedback strength among trait responses and all species. Understanding whether precipitation shifts can alter the phylogenetic signal of plant–soil feedbacks will improve predictions of plant community responses to climate change, providing lessons for intercropping and improving species choices in replanting prairie ecosystems.

Long O[1]; Rudra Sarma D[1]; Ghosh A[1]. METAGENOME ANALYSIS OF POULTRY LITTER COLLECTED FROM FARMS ACROSS EASTERN REGION OF KANSAS WITH A FOCUS ON ANTIBIOTIC RESISTANT AND FOODBORNE PATHOGENS.

[1]Pittsburg State University

There is growing concern about the use of antibiotics in food animals and poultry. Efforts are in place to bring in a change to the usage of antibiotics in animal husbandry primarily addressing the negative impact on human health besides acknowledging other confounding factors. CDC

data shows Salmonella causes about 1.35 million infections, 26,500 hospitalizations, and 420 deaths while more than 2.8 million antimicrobial-resistant infections occur annually in the U.S. This study aimed (i) to investigate the abundance of antibiotic-resistant enterococci and (ii) to determine the prevalence of pathogenic Salmonella serovers in poultry samples. Poultry litter was collected from 13 different farms around eastern region of Kansas using the collection kit that contained 5 collection tubes. One gram of each sample was diluted with phosphate-buffered saline and evenly distributed on Neogen Petrifilm® Rapid Aerobic Count plate and subsequently based on dilution count plated on mEnterococcus agar. A total of 160 putative enterococcal colonies were streaked on nutrient agar and confirmed at the genus level using esculin hydrolysis. All confirmed isolates are being characterized for antibiotic resistance and virulence profile. A fraction of each litter sample was processed for total DNA extraction using MagBeads FastDNA® Kit for feces. DNA concentration was determined using agarose gel electrophoresis and nanodrop. Further experiments including PCR amplification of 16S rRNA gene and metagenome sequence analysis are in progress. The data obtained from this research will not only address food safety issues but will actively contribute to potential risk mitigation strategies in small-scale animal husbandry.

MacDonald J[1]; Smith JJ[2]; Diffendal RF Jr.[3]; Möller A[1]. PRELIMINARY RESULTS OF ZIRCON-DATING VOLCANIC ASH BEDS IN THE OGALLALA GROUP, NORTHERN GREAT PLAINS REGION

[1]Department of Geology, University of Kansas; [2]Kansas Geological Survey, University of Kansas; [3]Conservation and Survey Division, School of Natural Resources and University of Nebraska State Museum, University of Nebraska-Lincoln

The Miocene Ash Hollow Formation (AHF) in the upper Ogallala Group in Nebraska is a complex sequence of alluvial deposits. The Ogallala Group is made up of terrigenous sediments that were deposited eastward from the Rocky Mountains onto the Great Plains during the Miocene between around 18 and 5.5 million years ago. Local and regional correlation of these units is complicated by the cut and fill structures and significant heterogeneity of the AHF and the Ogallala Group in general. Over 100 distinct volcanic ash deposits are visible in the AHF in the North and South Platte river valleys in Nebraska's southern panhandle. Although certain ash beds are partially or completely cemented by calcium carbonate creating resistant ledges, the majority of the ash remains silvery gray and unmodified. Most of these ashes were likely produced by volcanic eruptions associated with the Snake River Plain-Yellowstone hotspot track in Idaho and coincident with AHF deposition. Twenty-three ash beds were sampled from 6 sections in Morrill Co. NE. We selected at least 100 zircons per sample for U-Pb dating via laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) to estimate maximum depositional ages (MDAs) and provenance of sediment source areas. To date, samples from one section have produced 3 MDAs;in stratigraphically descending order these are 10.4 ± 0.2 Ma, 10.9 ± 0.2 Ma, and 12.6 ± 0.3 Ma. These zircon dates correspond to a series of Plinian eruptions in Idaho from the Bruneau-Jarbidge volcanic field that was active from 12.7 to 10.5 Ma, and the Owyhee-Humboldt volcanic field that was active from 15.2 to 12.7 Ma. Determination of

absolute ages and provenance of the AHF ashes is ongoing, with the intent of establishing a regional chronostratigraphic framework of Ogallala Grp throughout the Great Plains.

Manning E[1,2]; Ortega-Ariza D[2]; Bohling GC[1]. AIRBORNE ELECTROMAGNETIC (AEM) DELINEATION OF AQUIFER AND NON-AQUIFER LITHOLOGIES IN NORTHWESTERN KANSAS: IMPLICATIONS FOR AQUIFER HETEROGENEITY (PRELIMINARY RESULTS).

[1]University of Kansas; [2]Kansas Geological Survey

The Ogallala aquifer is a critical groundwater resource in the central High Plains but is experiencing significant depletion due to intensive agricultural use. In the central High Plains region, including Nebraska, Colorado, and Kansas, the aquifer covers approximately 101,000 km2 and can reach thicknesses of up to 250 m. Because groundwater withdrawals exceed recharge in many areas of western Kansas, improved understanding of the internal structure and heterogeneity of the aquifer is important for effective groundwater management. This study investigates lithologic heterogeneity within the Ogallala aquifer in Thomas County, northwestern Kansas, and evaluates the utility of Airborne Electromagnetic (AEM) data for identifying aquifer and non-aquifer intervals. AEM surveys across GMD4 were conducted using a helicopter-transported sensor system that measures subsurface electrical resistivity to depths of approximately 500 ft, providing three-dimensional information on subsurface properties. To constrain lithology and stratigraphy, AEM data are integrated with existing petrophysical well logs and published geologic reports. Twelve stratigraphic sections were constructed from geologic reports and compared with approximately 140 nearby well logs, including gamma ray, density, and resistivity logs, to identify lithologic trends within the Ogallala Formation. These stratigraphic columns were used to generate cross sections that evaluate vertical and lateral lithologic variability across the study area. The cross sections are being compared with AEM resistivity profiles to distinguish aquifer intervals from non-aquifer intervals and assess the continuity of permeable units. Aquifer intervals are typically associated with coarse-grained lithologies such as sand and gravel, whereas non-aquifer intervals are dominated by finer-grained deposits including silty sand, clay, and shale. Preliminary results indicate substantial heterogeneity within the Ogallala Formation, characterized by interbedded sand, gravel, silt, and clay units. Initial comparisons between well log data and AEM resistivity profiles suggest that the vertical and lateral distribution of aquifer intervals can be effectively mapped using this integrated approach. These results highlight the value of combining geophysical and stratigraphic datasets to better characterize aquifer architecture and heterogeneity. Ongoing work focuses on refining correlations between lithology and resistivity patterns to improve interpretation of AEM data and support more detailed characterization of groundwater resources in western Kansas.

Manning I[1]; Gonzalez VH[1]; Youngblood A[2]; Thrift C[2]; Ostwald M[3]; Seltmann K[2]. 3D MODELING IMPROVES BEE SURFACE AREA AND VOLUME ESTIMATES: IMPLICATIONS FOR THERMAL TOLERANCE.

[1]University of Kansas; [2]Cheadle Center for Biodiversity and Ecological Restoration, University of California, Santa Barbara; [3]Queen Mary University of London

Bees are sensitive to temperature, and their tolerance depends on their size and shape. Smaller bees have a higher surface-area-to-volume ratio (SA:V) and gain and lose heat more rapidly than larger bees. In bees, body width or intertegular distance (ITD) is often measured as an estimate of body size. In this study, we asked 1) how does bee body size predict thermal tolerance and 2) what is the best method to assess SA:V as a proxy for body size? We collected approximately 200 wild bee specimens from eastern Kansas across a wide range of species (>30) and sizes and weighed all individuals. We ran bioassays to assess the critical thermal minimum (CTmin, low temperature threshold at which coordinated muscle function is lost) and maximum (CTmax, high temperature threshold) for each individual. We measured all specimens' ITD and body length and used ITD as the diameter and body length as the height to calculate surface area and volume using the formula for a cylinder. We photographed and 3D modeled 1-2 individuals per species to accurately measure surface area and volume for each species. Our results suggest that measuring surface area and volume as a cylinder using ITD and body length underestimates surface area, volume, and SA:V. Specifically, using the cylinder method to estimate surface area had a mean percent error (MPE) of -150% compared to measurements from a 3D model, volume had an MPE of -124%, and SA:V had an MPE of -38%. Further, when assessed using measurements from 3D models, we found no relationship between CTmin and surface area, volume, or SA:V, but detected a potential positive relationship between CTmax and surface area and volume and negative relationship between CTmax and SA:V. However, this relationship was non-significant. As this project is ongoing, a larger sample size will allow us to uncover more accurate interpretations of these relationships. Finally, we found a significant positive relationship between bee weight and CTmin and CTmax, indicating that it may be a stronger predictor of bee thermal tolerance than surface area and volume.

Mathison MG[1]; Tang KK[1]; Smith SY[2]; Atkinson BA[1]. FOSSIL FRUIT FROM THE LATE CRETACEOUS OF ANTARCTICA SHEDS LIGHT ON THE EARLY BIOGEOGRAPHICAL HISTORY OF CORNALES, THE DOGWOOD ORDER

[1]University of Kansas, Department of Ecology and Evolutionary Biology, Biodiversity Institute; [2]University of Michigan, Earth and Environmental Sciences

The dogwood order, Cornales, consists of 10 families and is characterized by two fruit forms: drupaceous and capsular. Drupaceous cornaleans, such as Cornaceae (dogwood family) and Nyssaceae (tupelo family), have an extensive fossil record reaching back to the Late Cretaceous. However, all previously described fossils of Cornales have been recovered from the Northern Hemisphere. Here, we characterize a new cornalean fruit from the Late Cretaceous of Antarctica. The fossil was recently recovered from the mid-Campanian (ca. 80 Ma) Sitio Feliz Locality of James Ross Island. The fossil endocarp is three-dimensionally preserved down to the cellular level. We sectioned the fossil using the cellulose acetate peeling method and studied it using light microscopy. To determine the phylogenetic affinity of the fossil within Cornales, we conducted a Bayesian phylogenetic analysis using a morphological dataset of extant and extinct Cornales. The fossil fruit is comprised of a thick-walled woody endocarp (i.e. fruit pit). The fleshy layer of the fruit is not preserved. The endocarp is at least 6.27 mm long and ~3.64 mm wide and contains three locules, each associated with apically opening germination valves.

Locules contain a single apically attached seed with copious endosperm. Each germination valve has 2-3 sharp ridges. The endocarp is sclerenchymatous, with isodiametric and elongate sclereids. The endocarp lacks typical central vasculature seen in most fruits;instead, it has vascular bundles located at the periphery of the septa (inner fruit wall) that transverse the fruit to supply the ovules. Additional vascular bundles are in the central axis adjacent to the ventral wall of locules;however, this is distinct from having a single large central bundle. Fruits with woody endocarps, germination valves, one apically attached seed per locule, and no central vasculature are assignable to Cornales. Therefore, we assign the Antarctic fossil fruit to this order. The fossil fruit has a unique combination of characters that indicate it represents a new genus. The phylogenetic analysis recovered the Antarctic fossil in a clade composed entirely of extinct Northern Hemisphere Cornales. This work sheds light on the evolution of Southern Hemisphere floras during the Cretaceous by revealing that Antarctic polar ecosystems surprisingly contained Northern Hemisphere plant lineages.

McCreight RJ[1]; Schmidt SE[1]. ALTERNATIVE SOLVENTS TO DICHLOROMETHANE FOR RING CLOSING METATHESIS OF AZAMARCOCYCLES.
[1]Washburn University
Using ring-closing metathesis (RCM), azamacrocycles can be synthesized from carbon chains of 12 or more atoms that terminate in carbon–carbon double bonds. Dichloromethane has traditionally been employed as the solvent for RCM reactions; however, compliance with OSHA Standard 1910.1052, which requires monitoring of dichloromethane exposure, can make its use cost prohibitive. In this study, 1,2-dichloroethane, diethyl ether, and acetic acid were evaluated as potential alternatives to dichloromethane. Thin-layer chromatography (TLC) and proton nuclear magnetic resonance spectroscopy (^{1}H NMR) indicate that 1,2-dichloroethane is a promising substitute. Although it shows potential as a solvent, catalytic conversion rates of only 67% were observed, resulting in relatively low reaction yields. Future work will investigate increased or incremental catalyst loading as well as thermal excitation through sonication or heating. Additional solvents will be tested, looking for larger catalytic conversion rates.

McGehee JG[1]; Gleason JM[1]. STARVATION TOLERANCE IN INDIVIDUALLY- AND GROUP-HOUSED *ZAPRIONUS INDIANUS* MALES AND FEMALES.
[1]University of Kansas
Starvation is one of the most common environmental stressors faced by organisms in changing environments and organisms may alter their behavior to mitigate the effects of starvation. Starvation can be used in experiments to alter behavior and, when assessing aggressive behaviors in the presence of a food resource, a two-hour starvation period is used to increase aggression in *Drosophila melanogaster*. However, another species of fruit fly, *Zaprionus indianus*, displays very little aggressive behavior in the presence of a food resource following a two-hour starvation period. Additionally, in our lab, *Z. indianus* cohorts have been observed alive in population cages up to one week following the removal of food resources. To generate starvation curves and assess if there is a benefit to being in a group under starvation conditions, I am housing flies of both sexes either individually or in same-sex groups of ten individuals in vials containing

nonnutritive agar, so there is a water source but no food. Every 12 hours I am counting the number of dead individuals until all flies have died. In other drosophilids, females have a greater starvation tolerance than males, so we expect females to live longer without food than males. If there is a benefit to being in a group under starvation conditions, such as deriving nutrients from the dead bodies of other flies, we expect the flies in groups to live longer than the flies housed individually. If individual and cohort-reared flies differ in lifespan under starvation conditions, follow-up experiments will be conducted to determine the cause of the difference.

Melkonian Gakiya G[1]; Wright G[1]; Bjerke SL[1]. A TALE OF TWO SCOBYS: KYLE AND BECKY.
[1]Washburn University
Kombucha is a fermented tea that is consumed for its gut health benefits. The key to this process is a community of bacteria and yeast called a SCOBY. This community lives amongst a gooey, cellulose structure formed by some of the microbes that live there. Two different cellulose-producing bacteria, nicknamed, Kyle and Becky were isolated from local craft kombucha. Kyle and Becky both produce similar forms of cellulose as shown by electron micrographs. In addition, both bacteria produce large amounts of cellulose under both stationary and shaking conditions and in various volumes. However, Kyle consistently forms smaller amounts of cellulose, but in larger clumps than Becky. Especially at slower shaking speeds, Becky will form small globules of cellulose instead. On solid media, Becky forms slightly larger colonies than Kyle. We have previously identified Kyle as *Komagataeibacter rhaeticus*. To further investigate the cellulose produced by this bacterium we added Kyle's cellulose to a commercially purchased SCOBY to make kombucha. In comparing this kombucha with a batch prepared only with the commercial SCOBY, we observed that the addition of Kyle's cellulose resulted in a much larger SCOBY and surprisingly, yielded significantly more yeast from the SCOBY. Future directions include identifying Becky, as well as adding her cellulose to a commercially produced SCOBY to see how fermentation of the kombucha is affected.

Miller BW[1]; Smith DR[1]. SOCIAL AGGREGATION OR BEGRUDGING COHABITATION IN THE OPILIONID *LIBITIOIDES SAYI*?
[1]University of Kansas
Aggregation behaviors in harvestmen (Arachnida: Opiliones) are common and varied, but little-known outside the world of arachnology. This study investigates aggregation behavior of the opilionid *Libitioides sayi* (Opiliones: Laniatores: Cosmetidae), whose aggregation behavior has a daily cycle. From late spring to early autumn, *L. sayi* forage individually during the night and shelter in humid places under logs or rocks during the day, forming small aggregations. In the spring and summer of 2025, we found and collected aggregations in Lawrence, KS, ranging in size from 2 to 30 individuals, and also collected individuals as they foraged in the evening. We address two questions: (1) Do *L. sayi* aggregations form because the number of suitable shelters is limited, or do individuals prefer sheltering with conspecifics? (2) Since chemical communication is known to be important for opilionids, are odors important in formation of aggregations? If offered a choice between a "clean" shelter and one that has been inhabited by

conspecifics, do individuals show a preference for previously occupied ("smelly") shelters? Methods 1 and results: Individuals collected in 2025 were uniquely marked with two dots of paint for identification. They were housed in terraria with a moist mixture of soil, sand and coconut fiber ("soil mix") and shelters such as cork bark or egg-carton cups. They were kept on a 12L:12D light cycle at warm room temperature. Test arenas were plastic fruit salad trays with clear plastic covers. Soil mix was placed in the trays, and two wooden shelters (12 X 12 cm wood blocks with two 5-6 mm wide channels carved in the bottom) were placed inside, channels downwards. Two individuals were placed in the arena along with a food dish, to forage and select a shelter, and the plastic lid was put in place. After 24 hours the shelters were turned over and the location of each individual was noted (each under a separate shelter, or both under the same shelter). This was repeated with different pairs of individuals until seventy tests had been completed. The frequency at which individuals were found sharing a shelter was not significantly different from that expected if each individual chose a shelter without regard to presence or absence of a conspecific. This supports the hypothesis that *L. sayi's* aggregation behavior is influenced by availability of suitable shelters. Methods 2: Individuals were marked and housed as above. Two shelters were placed in each test arena: one thoroughly cleaned and dried, while the other had been placed for several days in the main group terrarium and occupied by several individuals. One individual was placed in the test arena; after 24 hours we scored which shelter was chosen. After each test, both shelters are removed and replaced with a clean block and a new "smelly" block. This experiment is being performed now with individuals collected in 2025 and will be continued with freshly collected individuals when they emerge this spring. Stay tuned for results.

Murray MA[1]; Rhinehart PD[1]; Beard KC[1]. A NEW SPECIES OF THE EARLY EUTHERIAN *ACMEODON* FROM THE PALEOCENE OF THE BISON BASIN, FREMONT COUNTY, WYOMING.

[1]Ecology and Evolutionary Biology and Biodiversity Institute, University of Kansas

Acmeodon is a genus of likely insectivorous eutherian mammals known from Montana, Wyoming, Utah, and New Mexico and existed in North America from the Torrejonian to early Tiffanian (~62-59 Ma). There are currently two named species, *Acmeodon secans* Matthew and Granger, 1921 and *Acmeodon hyoni* Rigby, 1980. *Acmeodon* was originally classified as a leptictid but has since been assigned to the family Cimolestidae. More recent field seasons have led to the discovery of a younger species of *Acmeodon* from the early Tiffanian (Ti-2;~60.5 Ma). The new species of *Acmeodon* differs from *A. secans* in having the mesial trigonid of p4 either lacking a paraconid or retaining a small cusp low on the crown and instead has a large, straight plagiaulacoid appearing preprotocristid leading to the protoconid. The distal trigonid of p4 has a mesiodistally parallel metaconid and protostylid on opposite sides of a deep fissure that runs mesiodistally. The p4 talonid of A. new species is broader than *A. secans* and has distinct entoconid, hypoconid, and hypoconulid. The P4 of A. new species has a square occlusal outline with an expanded stylar shelf compared to *A. secans*. The P3 of A. new species also differs from *A. secans* with one extra neomorphic cusp on the distobuccal end and the presence of a small parastylar lobe. The original diagnosis of *A. hyoni* emphasized size differences between *A. hyoni*

and *A. secans* without describing other morphological differences. However, new fossil data has shown that *A. hyoni* has a complete paraconule and metaconule present on M2 and a deeper ectoflexus which are features not present in the new species. This new species from the Bison Basin furthers our understanding of the phylogenetic relationships, distribution, and lifestyle of *Acmeodon*.

Orth RO[1]; Treml JA[1]; Daggett ME[1]; Mattingly BR[1]; Thomas SO[1]; Akhavan DA[2].
ENGINEERING MACROPHAGES IN THE PURSUIT TO COMBAT SOLID TUMORS.
[1]University of Kansas; [2]University of Kansas Medical Center
Despite major advances in therapies for hematologic malignancies, many of these approaches show limited efficacy in solid tumors due in part to the heterogeneous and immunosuppressive tumor microenvironment (TME). Tumor-associated macrophages (TAMs) can comprise a substantial fraction of immune cells within solid tumors and frequently adopt an M2-like, pro-tumor, anti-inflammatory phenotype that supports tumor growth and suppresses anti-tumor immunity. This work explores engineering and/or reprogramming macrophages to shift TAMs toward an M1-like, pro-inflammatory, anti-tumor state. We hypothesize that repolarizing TAMs will remodel the TME into a more immunostimulatory environment, thereby enhancing tumor susceptibility to subsequent or combinatorial treatments.

Paget AJ[1]; Rhinehart PD[1]; Miller KE[1]; Anemone RL[2]; Beard KC[1]. NEW SPECIES AND LATEST OCCURRENCE OF THE EARLY METATHERIAN *MIMOPERADECTES* FROM THE EARLY EOCENE OF THE GREAT DIVIDE BASIN OF SWEETWATER COUNTY, WYOMING.
[1]Ecology and Evolutionary Biology and Biodiversity Institute, University of Kansas; [2]Anthropology, University of North Carolina Greensboro
Mimoperadectes is a genus of peradectid metatherian known from the earliest Eocene of Wyoming. The first named species of *Mimoperadectes*, was *M. labrus* Bown and Rose, 1979, from the earliest Wasatchian (Wa0-1) in the Willwood Formation of Wyoming. A second species, *M. houdei* Horovitz et al., 2009, was also described from specimens found earliest Wasatchian (Wa0-1) of the Willwood Formation of Wyoming. The Smiley Draw local fauna of the Great Divide Basin in Sweetwater County, Wyoming is a grouping of two fluvial sandstone localities that have produced a large number of well-preserved fossils. The age of the Smiley Draw local fauna represents an ongoing investigation, but the age is approximately middle-late Wasatchian (Wa4-6). If the age of Smiley Draw is middle-late Wasatchian, *Mimoperadectes* new species would represent the youngest occurrence of the genus by roughly 2 million years. *Mimoperadectes* new species is comprised of a collection of unassociated molars representing M1-4 and m1-4 from multiple individuals. The Smiley Draw species is differentiated from *M. houdei* by the connection of the preparacrista to stylar cusp B on M2, and the precingulum of the M3 connecting to stylar cusp A. The Smiley Draw species differs from *M. labrus* in the prominent ectoflexus of M2 and M4, the prominent and distally placed entoconid of m4 and distally placed m4 hypoconulid. From both *M. labrus* and *M. houdei*, the Smiley Draw species shows a reduction of stylar crests connecting the stylar cusps. These characters reinforce the

larger size of M. new species compared to *M. labrus* and *M. houdei* and the later appearance of the Smiley Draw species.

Pellegrini BS[1]. A PRELIMINARY ANALYSIS OF THE IMPACT OF MATERNAL PARITY AND LITTER SIZE ON THE POST-NATAL GROWTH PERFORMANCE OF DOMESTIC LAMBS.
[1]Udall High School
Ewe parity and litter size have been shown to strongly impact the growth in lambs (Gardner et al., 2014). For Kansas farmers, it is still difficult to determine how much a ewe's experience with larger litters and parity will lessen the growth deficits linked to larger litters (Department of Animal Sciences and Industry). Even when raising an identical number of offspring, it was hypothesized that multiparous (experienced) ewes would produce lambs with higher growth rates and larger total weight gain than primiparous (first-time) mothers. To evaluate this hypothesis, 21 lambs from 12 ewes were monitored across four groups: primiparous singles (P-Single), primiparous twins (P-Twin), multiparous twins (MP-Twin), and multiparous triplets (MP-Triplet). Average Daily Gain (ADG) was calculated every two weeks till weaning. The data suggests lamb growth and development are significantly influenced by ewe experience and parity. Among groups raising twins, lambs from multiparous mothers exhibited significantly higher total weight gains and ADG compared to those from primiparous mothers (P=0.021, n=10). Additionally, growth rates in the MP-Triplet group declined toward the end of data collection, indicating a biological limit (Piantoni and VandeHaar, 2016). These findings suggest that parity is the primary factor in early lamb development and that Kansas sheep producers should provide primiparous ewes carrying multiples with more nutritional support to close the growth difference.

Peterson KS[1]; Gleason JM[1]. DEVELOPING GENETIC MARKERS FOR PARENTAL DETERMINATION IN *DROSOPHILA SUZUKII*.
[1]University of Kansas
Reproductive success is a key component of evolutionary fitness. Competition for limited resources, such as food, mates, and nest sites, has a significant impact on reproductive success. *Drosophila suzukii* is an agricultural pest that lays eggs on ripening soft fruits. Ripening fruit can be a limited resource that could drive competition among females for oviposition sites. Therefore, the quality of the fruit could affect oviposition choice and reproductive success in *D. suzukii*. We wish to contrast female reproductive success when a female lays in unoccupied fruit or previously laid in fruit. To be able to determine the reproductive success of a female when she lays eggs in occupied fruit, eggs laid during experiments must be cultured to the adult stage and genotyped to identify the female that laid them. To develop molecular markers for genotyping, we are using microsatellites. Previous work identified microsatellites in European strains. Our lab works with strains that were collected in Kansas. We evaluated 11 microsatellites in two lines of *D. suzukii* using PCR amplification and gel electrophoresis. Of the 11 microsatellites tested, six have variability, with three having different fixed alleles between the two lines. These microsatellites will be used to identify parentage in future egg laying experiments.

Puerta GLB[1]; Leung SH[1]. SELECTIVE OXIDATION OF SUBSTITUTED PYRROLES USING OXONE AS A GREEN OXIDIZING AGENT.
[1]Washburn University
Selective oxidation of substituted pyrroles is an important transformation in the synthesis of porphyrin derivatives and related heterocyclic compounds. A common synthetic challenge involves converting an α-methyl substituent on a pyrrole ring into the corresponding aldehyde while avoiding overoxidation or degradation of the heterocyclic structure. Traditional oxidizing agents such as potassium permanganate and sodium dichromate often lead to excessive oxidation or poor selectivity, while other reported reagents, including sulfuryl chloride and lead(IV) acetate, raise concerns due to toxicity and harsh reaction conditions. This study investigates the use of Oxone (potassium peroxymonosulfate) as a greener and potentially more selective oxidizing agent for the conversion of α-methyl pyrroles to aldehydes. It was hypothesized that Oxone could promote controlled oxidation under mild conditions while minimizing overoxidation to carboxylic acids and preventing decomposition of the pyrrole ring. Substituted pyrrole substrates were subjected to oxidation reactions using Oxone with surface-mediation by silica gel under varying reaction conditions, including different solvent systems, reagent stoichiometries, temperatures, and reaction times. Optimization of these parameters resulted in improved reaction efficiency and selectivity. Under optimized conditions, the surface-mediated oxidation using Oxone/silica gel produced aldehyde products with approximately 20% higher yield compared to previously tested conditions while reducing observable overoxidation and decomposition of the pyrrole ring. These results demonstrate that Oxone/silica gel can serve as an effective and environmentally favorable oxidizing agent for the selective oxidation of pyrrole derivatives, providing a more sustainable approach for synthetic pathways relevant to porphyrin chemistry and related heterocyclic compounds.

Richey A[1]. ASSESSING THE EFFECT OF ENVIRONMENTAL STRESSORS ON NATIVE POLLINATORS.
[1]University of Kansas
Bees are important for pollination and environmental homeostasis, and climate change is one of the largest stressors disrupting this equilibrium. Solitary bees are more sensitive to environmental stressors, such as temperature changes and pathogens, and are understudied relative to social species (bumble bees and honeybees). This ongoing research assesses the impact of starvation, immune response, and body lipid content on the thermal tolerance of *C. inaequalis*. This native early spring bee emerges before steady food sources, with males emerging two weeks before females. This suggests males will display greater starvation tolerance than females, which emerge with more food available. Bees are also exposed to different pathogens and diseases. With temperature variability in the spring, bees that are fighting disease may have different thermal tolerances compared to healthy bees. Finally, female bees are larger than males, so they likely have a higher lipid content, which might change their ability to cope with changes in temperature. We will study the population of bees from KU's campus and will measure starvation tolerance in the absence of food. The impact of the immune response will be tested by inserting a nylon string into the bee's abdomen for 24 hours prior to

assessing the cold and heat tolerances. Once the test is complete, the nylon will be removed from each bee to quantify the immune cell count on each nylon. Finally, the lipids will be removed from the bees, and the percent body lipid content will be compared to the results of the thermal tolerance test. We plan to make comparisons to honeybees, which are similar sized social bees which are also active in the early spring.

Riner MA[1]; Ortega-Ariza D[2]; Fairchild JM[1]. PALEOENVIRONMENTAL CHANGES DURING THE MIOCENE IN A TROPICAL SHALLOW SEA, PUERTO RICO.
[1]Lawrence High School; [2]Kansas Geological Survey-University of Kansas
Limestone rocks can contain abundant marine fossils that provide insight into environmental conditions during sediment deposition. This study analyzes Miocene rocks from an active quarry near Ponce in southern Puerto Rico. During the Miocene (approximately 15 million years ago), the study area was part of a shallow tropical sea. The goal of the study is to document the vertical variability in fossil types and abundance from the base (older rocks) to the top (younger rocks) of a measured section in the quarry. Thin-section (microscope-scale samples) photographs were analyzed using JMicrovision, and fossils were quantified through point counting to systematically calculate fossil abundance. Results indicate a shallow-marine environment characterized by large benthic foraminifera, mollusks, bryozoans, and occasional corals. Variations in fossil abundance suggest minor changes in environmental conditions throughout the section, while coarse-grained lithologies are consistent with shallow, moderate energy depositional settings. Healthy shallow tropical marine environments commonly contain abundant corals forming reefs. However, the limited coral material observed in the Ponce section may indicate that environmental conditions were not optimal for reef development. The scarcity of coral fossils may support the hypothesis of regionally unfavorable conditions in parts of the Caribbean during the Miocene.

Sanford NW[1]; Russell FL[1]; Houseman GR[1]. EFFECTS OF MERISTEM MINING BY INSECTS AND SOIL NUTRIENT AVAILABILITY ON THE PHENOLOGICAL DEVELOPMNET OF *CIRSIUM ALTISSIMUM* (TALL THISTLE).
[1]Wichita State University
Reproductive phenology is a fundamental aspect of plant life history. Further, plant reproductive phenology and the seasonal availability of plant resources such as pollen and nectar may affect populations of floral-feeding insects, a guild of conservation concern. Our research addresses the phenological response of *Cirsium altissimum* (tall thistle) to insect herbivory, especially meristem mining, and soil fertilization. We sought to answer the following questions 1) how does insect herbivory impact flowering and seed dispersal phenologies of *C. altissimum*? and 2) how does soil nutrient addition impact flowering and seed dispersal phenologies? The study was conducted at the Wichita State University Ninnescah Reserve between July and October 2025. We collected phenology data in a 15-year experiment that involved two manipulations: soil was either enriched (fertilized) or ambient (no nutrient augmentation), and some plots received insecticide to reduce insect presence. Application of pesticides, however, did not completely prevent meristem mining. To compensate for this discrepancy, effects of meristem mining and

pesticide application were compared independently of each other. Thistles selected for the study were censused bi-weekly. We recorded plant height, diameters, and counts of heads in different stages of flowering or seed dispersal. The presence of insect herbivory significantly delayed initiation of flowering, with a small proportion of plants first flowering before August 16th. Further, insect herbivory marginally delayed the date of maximum floral display. Meristem mining significantly delayed whether plants flowered before August 16th and whether their maximum floral display occurred before August 16th. Neither meristem mining nor the general presence of insects significantly affected seed dispersal phenology. Soil fertilization did not significantly affect any aspect of reproductive phenology. In conclusion, the data suggest that the presence of insects delays flowering but has no effect on dispersal. Furthermore, when analyzing specifically the relationship between the damage of meristem mining and flowering the aforementioned relationships are stronger, indicating that meristem mining particularly has major impacts on reproductive phenology of *C. altissimum*.

Steigner DA[1]; Gutierrez AJ[1]; McCormick LF[1]. GREEN HYPOCHLORITE OXIDATION OF PRIMARY ALCOHOLS TO CARBOXYLIC ACIDS FOR THE UNDERGRADUATE ORGANIC CHEMISTRY LABORATORY.

[1]Emporia State University

Traditional alcohol oxidation often relies on chromium salts that generate hazardous waste byproducts, prompting interest in greener alternatives such as sodium hypochlorite (household bleach), which has been shown to effectively oxidize secondary alcohols to ketones. However, primary alcohols represent a greater challenge due to the added difficulty of selective oxidation to either an aldehyde or carboxylic acid. Existing literature precedent for application of the greener hypochlorite method to primary alcohols is limited, inconsistent, and difficult to reproduce. This project aims to develop a reliable and environmentally friendly undergraduate laboratory protocol for oxidation of primary alcohols to carboxylic acid using sodium hypochlorite. The optimized procedure employs ethyl acetate solvent, tetrabutylammonium bromide phase-transfer catalyst, and a reaction time of 40 minutes at 45 °C. Following acid-base extraction and vacuum filtration, carboxylic acid products were obtained in 20-70% yields and characterized by melting point and IR spectroscopy. The method was successfully applied to both saturated and unsaturated alcohols, with electron-poor 4-nitrobenzyl alcohol affording the highest yields. This work demonstrates the use of sodium hypochlorite as a safe, efficient, and sustainable alternative to chromium-based oxidation of primary alcohols, suitable for implementation in an undergraduate organic chemistry laboratory setting. Future efforts will focus on resolving the lower yielding reactions, expanding the substrate scope, and functional-group tolerance testing.

Szaraz FL[1]; Nguyen AT[1,2]; Hileman LC[1]; Matsunaga KKS[1,2]. THE EVOLUTION AND EXPRESSION PATTERNS OF ORGAN POLARITY GENES IN THE NORWAY SPRUCE.
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Genes responsible for partitioning leaves into abaxial (underside) and adaxial (upperside) domains have been extensively studied in flowering plants. Within this network of genes, KANADI (KAN) transcription factors are active in the abaxial domains of early leaf primordia and necessary for suppressing adaxial identity, promoting abaxial identity, and ensuring overall normal leaf development. Despite their essential roles, the expression patterns of KAN genes are poorly documented beyond flowering plants and have never been documented in conifers, a group of gymnosperms that include spruces, yews, redwoods, and pines. Conifers are an economically and evolutionarily important group, comprising the largest group of extant seed plants outside of angiosperms. Understanding the evolution and development of such patterning genes in conifers is essential to our knowledge of leaf evolution, but massive genome sizes and secondary metabolites have hindered gene expression analysis. To address this knowledge gap, we searched previously published transcriptomes of the Norway spruce (*Picea abies*, family Pinaceae) for KAN genes, expecting to find 2-3 KAN genes per the results of previous studies. After identifying four copies and confirming their positions in the KAN group using phylogenetic analyses, we performed in situ hybridization using an RNAscope protocol to assess where these genes are expressed in leaf primordia. Preliminary results show abaxial expression in leaf primordia for two copies, global expression across leaf primordia in one copy, and no expression in leaf primordia for the final copy. These results suggest that Picea abies KAN genes have both conserved and potentially novel expression patterns compared to flowering plants and that copies may have some functional redundancy due to overlapping expression boundaries.

Tackett A[1]; Calvert R[1]. THE CONNECTION BETWEEN SLEEP AND MUSCLE HEALTH IN COLLEGE ATHELTES.
[1]Tabor College
This study aims to determine how sleep affects musculoskeletal health by measuring the average grip strength, sleep quality, sleep quantity, caffeine intake, sleep disturbances, workout intensity, and frequency for 2-week periods between grip strength measurements. Musculoskeletal health was observed by getting an average grip strength, as this is the most widely accepted marker. Variables were then analyzed with a multiple linear regression model with robust standard errors. A weekly survey was sent to each of the 16 participating Tabor College students beginning October 12th, 2025, and concluding December 10th, 2025. In the pooled regression model (n=61 observations), we found that a higher average of hours of sleep per week was a significantly negative factor for lower grip strengths, while caffeine intake over 200mg was also a factor, but not as significant. It was also observed that workout intensity was positively associated with grip strength. The participants were also assessed on an individual level, where there were no significant variables. Sleep did show a small positive correlation, but it was not significant, and workout intensity showed a slight negative trend that was nearly significant. The data suggests that the correlation between sleep and musculoskeletal health is much easier to observe with

many different people as opposed to observing the relationships in a specific individual. A higher average of sleep across the 14-day periods and a caffeine intake of over 200mg also correlates with a lower grip strength. Another interesting finding was that a higher average workout intensity was associated with a higher average grip strength. The best ways to improve the health of the musculoskeletal system are to regulate sleep patterns such that the individual gets adequate sleep to feel refreshed without oversleeping. Caffeine intake should also be monitored, as crossing this threshold negatively affects the musculoskeletal system, and training the muscles in the body by relatively intense weight training will improve the overall health of the system.

Thompson LK[1], Mulcahy KD[1]. AN EXCEPTIONAL SPECIMEN OF THE LATE CRETACEOUS ANACORACID SHARK, *SQUALICORAX* FROM THE PIERRE SHALE OF WYOMING

[1]Department of Ecology and Evolutionary Biology and Biodiversity Institute, University of Kansas

The Cretaceous Western Interior Seaway (WIS) was a shallow sea spanning what is now the Great Plains of the United States. The WIS was home to a variety of life, including a diverse assemblage of shark species. *Squalicorax* is a genus of cretaceous shark that, while documented from species across the globe, is a quintessential taxon in the record of the WIS of North America. Due to their cartilaginous skeletal anatomy, shark teeth are often the best-preserved piece of a fossil shark with cranial and post cranial fossils being exceptionally uncommon. *Squalicorax* teeth are identifiable by the distally angled crowns and, in most species, serrated edges. Though teeth are well documented, cranial and post cranial fossils of *Squalicorax* are only known from a handful of specimens. Here, we describe a fossil of *Squalicorax* we refer to as *Squalicorax cf. pristodontus* that includes not only isolated teeth, but teeth that appear to have been preserved in articulation, as well as cartilaginous material consisting of partial cranial and post cranial structures. Collected in 2011 from the Pierre Shale of Wyoming, this specimen has remained undescribed within the KUVP collections. This specimen could bring new light to the understanding of *Squalicorax* species in the WIS and the reassessment of certain "wastebasket" taxon within the genus.

Vinton G[1]; Rault L[2]. FROM BLOOD MEAL TO EGGS: ABC TRANSPORTERS IN MOSQUITO REPRODUCTIVE BIOLOGY

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ATP-binding cassette (ABC) transporters are a large superfamily of transmembrane proteins that mediate the ATP-dependent transport of diverse substrates across biological membranes. Although ABC transporters are ubiquitous and play critical roles in insect physiology, their functional roles in mosquito feeding, development, and reproduction remain poorly characterized. This study investigated the role of ABC transporters in oviposition, larval development, and feeding behavior in *Aedes aegypti* mosquitoes as a preliminary step toward identifying transporter families involved in key physiological processes. To manipulate transporter activity, mosquitoes were exposed to the ABC transporter modulators elacridar and dexamethasone using capillary feeder assays (CAFE). Following treatment, adult females were

blood-fed to stimulate egg production. Oviposition was quantified per female, and reproductive success was assessed by measuring egg hatching rates. Larval development was also evaluated to determine whether transporter modulation affected early life-stage performance at the next generation. These preliminary experiments aim to identify physiological processes influenced by ABC transporters in mosquitoes. Understanding the roles of these conserved membrane transporters may provide new insights into the regulation of insect feeding, development, and reproductive biology.

Wagner PG[1]; Wagner TE[1]; Cadan GD[1]. COMPARISON OF ACUTE PHYSIOLOGICAL RESPONSES TO TWO VOLUNTARY HYPERVENTILATION PROTOCOLS IN COLLEGE-AGED PARTICIPANTS AT REST.
[1]Washburn University
Voluntary Hyperventilation (VH) represents a controlled modulation of breathing that may influence acute physiological responses and, theoretically, exercise performance. Effects on performance are hypothetically due to decreased carbon dioxide levels. Despite extensive research, the effects of VH remain inconsistent due to variability in protocol design, duration, intensity, and participant characteristics. We have compared two distinct Voluntary Hyperventilation Protocols (VHP) performed at rest in a sample of 14 college-aged participants: one characterized by fast breathing (60 breaths per minute, VHPF) and another by slow, deep breathing (12 breaths per minute, VHPS), each lasting 30 seconds. The main purpose is to see if they are equally effective in causing changes in end tidal volume partial pressure of carbon dioxide (PetCO2) and minute ventilation (VE). Additional variables measured include heart rate, oxygen saturation, and breathing frequency. When analyzing the data, there was a statistical difference between the two VHP. Results of this study allow us to determine one protocol (VHPF) is more effective at acute physiological changes in PetCO2 and VE while the subject is resting. Future studies will be used to determine if the change in these variables translates to improved athletic performance.

Wiiest AG[1]. TRAINING THE TRAINER: ANIMAL TRAINING AND WHAT WE CAN LEARN FROM OUR ANIMALS
[1]Friends University
Animal training is a complex process in which a trainer shapes the behavior of an animal. Training an animal is a great way to provide them with mental stimulation, physical exercise, and have them participate in their own care. Five different animal species were chosen (2 lizards, one turtle, one bird, and one mammal) for a training activity that aimed to provide wellness benefits to the animals while also providing the trainer with hands-on experiential learning. Training plans for each animal were developed, and daily training logs were maintained. Basic behavior training, such as targeting, was then followed by more advanced behavioral modifications. Techniques and training plans were modified as needed during the training process to accommodate the distinct learning style for each individual. The rate of successful behavioral modification was compared between the species tested.

Winters H[1]; Eggleston J[1]; Sytsma J[1]; Ricker A[1]; Galliart M[2]; McGuire A[3]; Collinsworth E[4]; Johnson L[1]. INTRASPECIFIC CLIMATE ADAPTATION AND RESPONSE TO VARIATIONS IN PRECIPITATION IN A DOMINANT PRAIRIE GRASS.
[1]Kansas State University; [2]Fort Hays State University; [3]Independent Researcher; [4]Southern Illinois University
Tallgrass prairie has been severely degraded in North America with less than 5% of this endangered ecosystem remaining intact and it is further threatened by increasing drought and temperatures. Big bluestem (*Andropogon gerardi*) is a dominant, native, and perennial prairie grass that is broadly distributed across North America and is ecologic ally and agriculturally important as a widely used plant in prairie restorations and a major forage for cattle. Our objectives were to examine climate adaptation in *A. gerardi*, including what climatic variable s best predicted trait variation and how climate of origin impacted population response s to differing precipitation levels. We hypothesized that differences in morphology and physiology between populations would be best explained by multi - year average precipitation or aridity from where the populations were sourced and phenology would be best explained by multi - year average temperature from where the populations were sourced. We expected that populations sourced from drier climates would exhibit more drought - tolerance - associated traits and populations sourced from wetter climates would show more traits associated with increased competition or light capture. We also hypothesized that low precipitation at the drier garden sites would have stronger negative impacts on the performance of populations sourced from wetter climates than populations sourced from drier climates when comparing the ir performance at the wetter garden sites. Additionally, we expected low precipitation to have stronger negative impacts on the performance of populations sourced from colder climates than populations sourced from warmer climates. To test this, 27 populations spanning mean annual precipitation (MAP) (420 - 1510 mm yr - 1) and mean annual temperature (6 - 21°C) gradients were transplanted to four garden sites across a precipitation gradient (western Kansas to Illinois , 510 - 1140 mm yr - 1 MAP) , with the mesic site (Manhattan, KS, 850 mm yr - 1) within the area of highest climatic suitability for *A. gerardi*. Our results showed that morphology and physiology were best explained by precipitation or aridity, with populations from drier climates having more drought - tolerance - associated traits (e.g. decreased aboveground biomass, thicker leaves, and decreased leaf water potential) and populations from wetter climates having more light - capture - associated traits (e.g., increased aboveground biomass and wider leaves). Additionally, populations sourced from wetter climates had a greater decrease in bio mass and a shorter delay in flowering time at the driest garden site than populations sourced from drier climates , compared to their performance at the wetter garden sites; populations sourced from colder climates had a lower decrease in biomass and a longer delay in flowering time at the driest garden site than populations sourced from warmer climates. These findings indicate that big bluestem is strongly adapted to precipitation and aridity across its range and changes in precipitation have significant impacts on *A. gerardi* traits. Therefore, future increases in drought may have large negative effects on *A. gerardi*, thus planting more drought tolerant populations of *A. gerardi* in areas where increasing drought is predicted may mitigate the negative impacts of increasing drought on this dominant grass species and the prairie ecosystem.

Zabinski WJ[1]. UTILIZING NATURAL HISTORY COLLECTIONS AND DATA MINING TO ASSESS FLOWER ASSOCIATIONS AND PHENOLOGY OF NORTH AMERICAN BEES IN THE GENUS *ANDRENA* (HYMENOPTERA: ANDRENIDAE) SUBGENUS *PLASTANDRENA*.

[1]University of Kansas

Even though bees are the most frequently discussed and important pollinators, most native species' fundamental ecology including phenology and flower preferences is not known. This is especially true within the mega diverse bee genus *Andrena* Fabricius, 1775 where only a small percentage of species floral associations have been assessed. Here, using label data with associated floral records and collection event dates, the phenology and flower visitations of North American bees in the *Andrena* subgenus *Plastandrena* Heidicke, 1933 is assessed. Results of Shannon–Wiener index, Simpson's diversity index, and occurrences on plant genera, families, and orders demonstrate *Andrena argemonis*, *Andrena mellea* are polylectic, while *Andrena crataegi*, *Andrena fracta*, and *Andrena prunorum* are broad polylectic. Plant-pollinator network analyses demonstrated the degree of polylecty within the subgenus, with *Andrena argemonis* being the most specialized towards *Argemone* and *Andrena mellea* being the most generalized. Collection event dates demonstrate all species phenology except *A. mellea* have a unimodal peak. However, the bimodal peaks in *A. mellea* may be due to geographic variation or sampling bias. Each species has peak records at varying times, showing some species are spring associated and others summer associated. This study provides an in-depth update of floral and phenological data of these understudied bee species, providing evidence that these bees may be important native pollinators that require more attention.

Zhang Q[1]; Alex Swider[1]. HEMP AS A HIVE PROTECTOR: HPLC DETECTION OF PHYTOCANNABINOIDS IN FORAGING HONEY BEES.

[1]Emporia State University

Honey bees (*Apis mellifera*) pollinate over 130 commercial crops, contributing an estimated $15 billion annually to the U.S. economy. However, in 2025, beekeepers reported losing 60% of their hives, largely due to pesticide exposure. With the expansion of industrial hemp (containing <0.3% THC) in Kansas, apiculturists are exploring its potential to protect bees from pesticide stress. Hemp produces phytocannabinoids such as cannabidiol (CBD) and cannabinol (CBN), antioxidant compounds known to upregulate oxidative stress pathway genes. High Pressure Liquid Chromatography (HPLC) is a technique used in analytical chemistry to separate, identify, and quantify compounds. In this study, HPLC was used to identify and quantify phytocannabinoids in honey bee foragers that had foraged on hemp plants. Several phytocannabinoids were detected at measurable levels in bee samples, demonstrating that these compounds can be naturally acquired through foraging and enter honey bee tissues. These findings provide analytical evidence of phytocannabinoid uptake in honey bees and support further investigation into the potential role of hemp-derived compounds in mitigating environmental stressors affecting pollinator health.

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