



61th Annual Meeting

Missouri Western State University

April 12-13, 2024

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General Information

Schedule of Events and Locations

Time	Event	Location
Friday		
7:00 – 8:30 PM	MAS Social	Spratt Stadium “Hall of Fame”
Saturday		
7:30 – 8:45 AM	Onsite Registration & Poster Set-up	Agenstein/Remington Hall Atrium
9:00 – 9:45 AM	In-Person Poster Session A	Agenstein Hall (See below.)
9:45 – 10:30 AM	In-Person Poster Session B	Agenstein Hall (See below.)
10:45- 11:45 AM	Plenary Session, Dr. David Ashley, “Academic Symbioses”	Spratt Hall 101
11:45 – 1:00 PM	Lunch – on your own	MWSU Dining Hall in Blum Union (\$10.50 plus tax) or Other
1:00- 1:30 PM	Business Meeting (all welcome to attend)	Agenstein Hall 224
1:30 – 4:30 PM	Oral Presentations	Agenstein/Remington Hall (See below.)

Oral and Poster Presentation Rooms and Areas

	Oral	Poster
Agriculture	No Oral Presentations	Agenstein 2 nd Floor
Biochemistry/Biomedicine/Biotechnology	Remington 209	Agenstein 2 nd Floor
Biology	Agenstein 328 & 330	Agenstein 2 nd Floor
Chemistry	Agenstein 124	Agenstein 2 nd Floor
Computer Science and Math	Agenstein 119	Agenstein 1 st Floor
Conservation	Remington 217	Agenstein 2 nd Floor
Geography	Agenstein 323	Agenstein 1 st Floor
Geology and Geosciences	Agenstein 326	Agenstein 1 st Floor
Physics and Engineering	Remington 117	Agenstein 1 st Floor
Science Education	No Oral Presentations	Agenstein 1 st Floor
Social and Behavioral Science	Agenstein 224 & 324	Agenstein 3 rd Floor

Letter from the MAS President

On behalf of the Missouri Academy of Science, it is my distinct pleasure to extend a warm welcome to each and every one of you to our Annual Meeting. As we gather once again to celebrate scientific inquiry, collaboration, and innovation, we are reminded of the invaluable contributions made by the scientific community in advancing knowledge and fostering a deeper understanding of the world around us.

This year's meeting promises to be an enriching experience, filled with insightful presentations, engaging discussions, and networking opportunities with fellow researchers, educators, professionals, and aspiring scientists from across Missouri and beyond. Whether you are a seasoned veteran in your field or just beginning your journey, this gathering serves as a platform for intellectual exchange and scholarly growth. It is this aspect of the academy that I find most rewarding. Not only does it bring together all the aspects of science to intermingle, but it also provides the opportunity for young scientists to interact with experienced professionals and learn what a difference a career in STEM-related fields can truly make in the world. As importantly, it allows those of us who have been in our fields a while to be inspired and reinvigorated as we talk with students whose curiosity has just begun to blossom.

For 90 years MAS has reinforced interdisciplinary collaboration. It is through this collaboration that we have the opportunity to tackle pressing issues such as climate change, public health, and technological innovation with fresh perspectives and pioneering solutions. Despite the obstacles we may face, our collective passion for knowledge and our commitment to the pursuit of truth continue to drive us forward, inspiring future generations of scientists to follow in our footsteps.

On behalf of all participants, I want to sincerely thank MWSU President Dr. Elizabeth Kennedy, Dr. Laura Reynolds, & Dr. Mike Ducey, for inviting us to hold our meeting on the MWSU campus. Thank you to Dr. Tilottama Roy & Dr. Michael Grantham for being such amazing campus hosts. Thank you to Dr. James “Tiger” Gordon and Dr. Shayna Burchett for your steadfast leadership as our Senior Division Director and Co-Director. Thank you to Dr. Teresa Boman and Dr. Katie Kilmer for serving diligently as Junior Division Directors. Finally, I also want to thank members of the MAS Executive Committee, the Business Manager, and the Section Chairs and Co-Chairs. Without all of you, these meetings would not be possible, and I am grateful to all of you for making my time as President so memorable.

In closing, I encourage you to make the most of your time here, whether it be through attending sessions, presenting your research, or simply engaging in conversations with your peers. May this meeting ignite your curiosity, fuel your passion for science, and forge lasting connections that will extend far beyond this meeting. I hope to see you all again next year in Warrensburg!

Warmest regards,
Damon Bassett
MAS President (2023-2024)

About the Missouri Academy of Science

Scientists of the State of Missouri organized in 1934 to form the Missouri Academy of Science. By April 6, 1934, a Constitution and By-Laws were prepared and on August 14, 1934, the organization was incorporated.

The purposes of this Academy were presented in the fourth "article of agreement" as follows: "This corporation is organized, not for profit but to promote the increase and the diffusion of the scientific spirit, and of promoting cooperation between the scientific interests of Missouri. It proposes to accomplish these purposes:

- a. By holding meetings for the presentation of scientific papers embodying the results of original research, teaching experience, or other information of scientific interest.
- b. By fostering public interest in scientific matters, through open meetings, press releases, and in such other ways as seem feasible.
- c. By encouraging local scientific organizations in every possible way.
- d. By promoting acquaintance in harmonious relationships between scientists in Missouri and among all who are interested in science.
- e. By supplying, so far as finances permit, a medium for the publication of results of original work, particularly those of special interest in this state.
- f. By concerning itself with legislation on scientific matters and providing an opportunity for discussion of such legislation.
- g. By working in any and all other ways which may prove feasible, for the advancement of science in Missouri."

The Academy held its organizational meeting on April 13-14, 1934, with 250 people attending. At the December 1934 meeting more than 400 people registered and by May 1935, there were approximately 750 members of the Academy. Statewide interest at a high level continued until activities made necessary by World War II disrupted Academy affairs except for some activity in the College Section.

Post-war revival of Academy activities started at a meeting on April 20, 1963, at Drury College. From the group of twelve persons who initiated the reactivation of the Academy in 1963, the membership has grown steadily to more than 800. Activities of the Academy have expanded to include the awarding of modest grants for projects proposed by high school and college students and sponsoring the establishment of a Junior Academy of Science.

The Missouri Academy of Science is a non-profit organization and is supported solely by membership dues and donations. That is why we appreciate each new member and the current members who renew so faithfully each year. It is because of their interest that the Academy continues its success as a fine scientific organization.

Section Programs

MISSOURI ACADEMY OF SCIENCE

Agriculture Poster Sessions

Agenstein Hall Second Floor

SESSION

AUTHOR/TITLE OF POSTER PRESENTATION

- A R. Gorden, K. Weston, K. Pierson, T. Kaullen, S. Thapa. Department of Agriculture, University of Central Missouri. **EVALUATION OF SITE-SPECIFIC SOILS FOR OPTIMIZING SOYBEAN GROWTH AND YIELD.**
- A W. King, T. Kaullen, K. Pierson, R. Gordan, and S. Thapa, Department of Agriculture, University of Central Missouri. **EVALUATION OF SITE-SPECIFIC SOILS FOR OPTIMIZING SOYBEAN GROWTH AND YIELD.**
- A C.A. Lloyd^a, K.W. Lovercamp^a, L.A. Walter^b and T.R. Parks^b, ^aDepartment of Agriculture, University of Central Missouri, ^bMerck Animal Health. **PARASITE EVALUATION OF YOUNG BEEF CATTLE IN WEST CENTRAL MISSOURI.**
- B J. Switzer, C. Fowler, M. Bailey, and S. Thapa, Department of Agriculture, University of Central Missouri. **EFFECT OF ZINC AND IRON FERTILIZERS IN SOFT RED WINTER WHEAT GERMINATION AND TILLER FORMATION.**
- B S. Thapa, B.A. Stewart, and Q. Xue, Department of Agriculture, University of Central Missouri. **MANIPULATING PLANTING GEOMETRY TO IMPROVE MICROCLIMATE AND GRAIN YIELD IN CORN.**

MISSOURI ACADEMY OF SCIENCE

Biochemistry, Biomedicine, & Biotechnology Section

Remington Hall Room 209

TIME

AUTHOR/TITLE OF ORAL PRESENTATION

- 1:30 M. Bigelow, K. Meek, C. Duncan, C. Coleman, L. Kovacs, Department of Biology, Missouri State University. **DEFENSE RESPONSE OF *VITIS RUPESTRIS* INDUCED BY THE INSECTICIDE CARBARYL.**
- 1:50 J. Cox and J. Smith, Department of Biomedical Sciences, Missouri State University. **THE EFFECTS OF THE OVEREXPRESSION OF *RAD51* AND *DMC1* ON GENOMIC STABILITY IN *TETRAHYMENA THERMOPHILA*.**
- 2:10 K. Franklin and A. Burris, Department of Biology and Environmental Health, Missouri Southern State University. **ISOLATING AND SEQUENCING THE HUMAN HGD GENE FROM CADAVERIC BONE.**
- 2:30 D. Patel, A. Subrash, E. Wagoner, S. Kuhnert, M. Kilmer, A. Barry, Department of Biology and Environmental Health, Missouri Southern State University. **EXPLORING THE CORRELATION BETWEEN CATECHOLAMINERGIC ACTIVITY IN THE CERVICAL VAGUS NERVE AND SIGNS OF CARDIAC REMODELING: IMPLICATION FOR VAGUS NERVE STIMULATION THERAPY.**
- 2:50 S. Miriyala^a, S. Manikandan^b, V. Manikandan^b, P. Manikandan^c, A. Relan^a, H. Pandaya^a and D. Waszczuk^a, ^aDepartment of Anatomy, AT Still University, ^bKirksville Senior High School, ^cDepartment of Cellular Biology Anatomy, Louisiana State University Health Sciences Center. **AUTOTAXIN-LPA-LPP3 AXIS ON THE BLOOD-BRAIN BARRIER FOLLOWING ACUTE AND CHRONIC ALCOHOL CONSUMPTION.**

MISSOURI ACADEMY OF SCIENCE

Biochemistry, Biomedicine, & Biotechnology Poster Sessions

Agenstein Hall Second Floor

SESSION

AUTHOR/TITLE OF POSTER PRESENTATION

- A A. Amjed, McQueary College of Health and Human Services, Missouri State University. **MALARIA IN SIXTH AND SEVENTH GRADE SCHOOL CHILDREN OF ZAMBIA'S EASTERN AND SOUTHERN PROVINCES: ON PREVENTION, MORBIDITY, AND GROWTH.**
- A A. Borup, Department of Biology, Missouri Southern State University. **A RADIOLOGICAL CASE STUDY HIGHLIGHTING COMMON FINDINGS OF PROSTATE CANCER.**
- A C. Fry, M. Havlicek, A. Hulme, Department of Biomedical Sciences, Missouri State University. **DETERMINING THE ROLE OF SPTBN1 IN HIV-1 UNCOATING.**
- A D. James and J. Wang, Department of Biomedical Sciences, Missouri State University. **MICROVASCULAR ENDOTHELIAL PERMEABILITY COEFFICIENT REGULATED BY PURINERGIC P2Y2 RECEPTOR.**
- A C. Knight, J. Wang, Department of Biomedical Biology, Missouri State University. **EFFECT OF P2Y₂ RECEPTORS ON LEUKOCYTE BEHAVIOR UNDER ACUTE INFLAMMATION IN TRANSGENIC MALE MICE IN VIVO.**
- A E. Liimatta, E. Schmoll, A. Shrestha, A. Carpenter, J. Smith, Department of Biomedical Sciences, Missouri State University **CHARACTERIZATION OF A NOVEL UV RESISTANCE PHENOTYPE IN TETRAHYMENA THERMOPHILA WITH RAD23Δ.**
- A J. Makhloufi, T. Le, R. Ulbricht, Ph.D., J. Wang, M.D., Ph.D., Department of Biomedical Sciences, Missouri State University. **INVESTIGATING THE EFFECTS OF INFLAMMATION AND P2Y₂ RECEPTOR ACTIVATION ON INSULIN RESISTANCE IN MICE.**
- B S. R. Moore, C. Lupfer, R. Ulbricht, Department of Biomedical Sciences, Missouri State University. **GLOBAL DNA METHYLATION IN A CRISPR CAS9 MEDIATED KNOCKOUT OF EBPI.**

- B N. Nalley, S. Antonopoulos, P. Durham, Department of Biology/ Jordan Valley Innovation Center, Missouri State University. **CHARACTERIZATION OF CALCIUM CHANGES IN RESPONSE TO KCL STIMULATION IN PRIMARY CULTURES OF NEURONS AND GLIA FROM CRYO-PRESERVED TRIGEMINAL GANGLIA: EFFECT OF NEURON-GLIA DENSITY.**
- B R. Pecka and A. Hulme, Biomedical Sciences Department, Missouri State University. **STUDYING THE LOCALIZATION OF SPECTRIN β NON-ERYTHROCYTE 1 AND ACTIN IN CHME3 CELLS TO BETTER UNDERSTAND HIV REPLICATION.**
- B C. Punzo, V. Cline, C. Taylor, A. Danner, and K. Walton, Department of Biology, Missouri Western State University. **THE EFFECTS OF PREBIOTICS ON THE SUSCEPTIBILITY TO DEXTRAN SODIUM SULFATE-INDUCED COLITIS IN MICE.**
- B D. Silva Torres, S. Antonopoulos, P. Durham, Department of Biology/Jordan Valley Innovation Center, Missouri State University. **METHOD FOR CRYOPRESERVATION OF SPINAL CORD TISSUE FROM SPRAGUE-DAWLEY RATS FOR ESTABLISHING PRIMARY CULTURES OF NEURONS AND GLIA.**
- B M. Scharnhorst, S. Antonopoulos, P. Durham, Department of Biology/ Jordan Valley Innovation Center, Missouri State University. **METHOD FOR CRYOPRESERVATION OF TRIGEMINAL GANGLION FOR ESTABLISHING PRIMARY CULTURES OF NEURONS AND GLIA FROM NEONATAL SPRAGUE-DAWLEY RATS.**
- B M. Scharnhorst, D. Silva, D. Aardema Faigh, S. Antonopoulos, P. Durham, Department of Biology/ Jordan Valley Innovation Center, Missouri State University. **THE EFFECTS OF COPPER OXIDE NANOPARTICLES ON GABAERGIC SIGNALING IN NEURONS AND GLIAL CELLS OF PRIMARY TRIGEMINAL GANGLION CULTURES FROM NEONATAL SPRAGUE-DAWLEY RATS.**
- B N. Lumbard and C. Wills, Department of Biology, Rockhurst University. **THE EFFECTS OF CREATINE ON BROWN PLANARIA REGENERATION.**

MISSOURI ACADEMY OF SCIENCE

Biology Section
Concurrent Session A

Agenstein Hall Room 328

Moderator: Dr. Teresa Boman (Missouri Southern State University)

<u>TIME</u>	<u>AUTHOR/TITLE OF ORAL PRESENTATION</u>
1:30	C. Barta ¹ , B. Jenkins ¹ , D. Lindstrom ¹ , A. Zahnd ¹ and G. Szekely ² , ¹ Department of Biology, Missouri Western State University, ² Department of Biology and Ecology, Babeş-Bolyai University, Cluj-Napoca, Romania. THE FIRST EVIDENCE OF GIBBERELIC ACID'S ABILITY TO MODULATE TARGET SPECIES' SENSITIVITY TO HONEYSUCKLE (<i>LONICERA MAACKII</i>) ALLELO-CHEMICALS.
1:50	R. Frye and C. Barta, Department of Biology, Missouri Western State University., ENHANCING CROP DEFENSE STRATEGIES AND PRODUCTIVITY THROUGH THE UTILIZATION OF BIOGENIC PLANT VOLATILE ORGANIC COMPOUNDS (VOCs) IN AGRICULTURE: A CASE STUDY.
2:10	D. Curtis and M. Kilmer, Department of Biology and Environmental Health, Missouri Southern State University. EXTENDED GENERATIONAL EFFECTS OF MICROPLASTIC EXPOSURE ON <i>DAPHNIA MAGNA</i>.
2:30	A. Stevens and M. Kilmer, Department of Biology and Environmental Health, Missouri Southern State University. CHRONIC EFFECTS OF MICROPLASTICS EXPOSURE ON AN AQUATIC MICROCRUSTACEAN, <i>DAPHNIA MAGNA</i>: A DETERMINATION OF MINIMUM EFFECTIVE CONCENTRATIONS.
2:50	I. Khan and D. Penning, Department of Biology, Missouri Southern State University. SNAKES: THE DIGESTIVE OLYMPIAN.
3:10	A. Sylla and V. Zeljkovic, Department of Chemistry and Physics, Lincoln University. COMPUTER ASSISTED ANIMAL BEHAVIOUR AND HABITS STUDY.

MISSOURI ACADEMY OF SCIENCE

Biology Section
Concurrent Session B

Agenstein Hall Room 330

Moderator: Dr. Jim Campbell (Northwest Missouri State University)

<u>TIME</u>	<u>AUTHOR/TITLE OF ORAL PRESENTATION</u>
1:30	R. Jani, K. Franklin, N. Gugnani and A. Burris, Department of Biology and Environmental Health, Missouri Southern State University. DETERMINING THE EFFECTS OF GLYCEROL AND RAFFINOSE MEDIA ON PROTEASOME LOCALIZATION.
1:50	A. Mantel ¹ , E. Diaz-Miranda ² , A. Lough ³ , G. Thurmon ¹ , ¹ Department of Marine Biology, ² Department of Obstetrics, Gynecology and Women's Health, University of Missouri, ³ Department of Biology, Central Methodist University. UTILIZING KNOWN SHARK SPECIES TO TEST THE PRECISION OF ENVIRONMENTAL DNA.
2:10	K. Knierim, and M. Ghosh-Kumar, Department of Biology and Chemistry, Cottey College. ANALYSIS OF MICROCYSTIN PRODUCTION OF CYANOBACTERIA WITH AN EXPOSURE OF ENVIRONMENTAL DRUG POLLUTANTS.
2:30	S. Lankford and B. Blede, Department of Biological and Clinical Sciences, University of Central Missouri. INVESTIGATING ECOPHYSIOLOGICAL LIMITS TO ELEVATED WATER TEMPERATURE IN LAKE STURGEON (<i>ACIPENSER FULVESCENS</i>)
2:50	E. Gardner, School of Science and Health, William Woods University. URBANIZATION AND PATHOGENIC INFECTION: AN OBSERVATIONAL STUDY OF INFECTION IN URBAN AND RURAL <i>PLANTAGO MAJOR</i> POPULATIONS.
3:10	A. Nkem, C. Stewart and A. Russell, Department of Biology, Missouri State University. HOW EPIPHYTIC BACTERIAL ABUNDANCE AND ENVIRONMENTAL CONDITIONS AFFECT FLOWER LONGEVITY.

MISSOURI ACADEMY OF SCIENCE

Biology Poster Sessions

Agenstein Hall Second Floor

SESSION

AUTHOR/TITLE OF POSTER PRESENTATION

- A M. Calfee¹, Z. Locke¹, A. Postlewait¹, D. Moser², S. Hamilton-Brehm³ and J. Campbell¹, ¹Department of Natural Sciences, Northwest Missouri State University, ²Division of Earth and Ecosystems Sciences, Desert Research Institute, ³Department of Microbiology, Southern Illinois University. **CULTIVATION AND CHARACTERIZATION OF *HALALKALIBACTERIUM* sp. ZL23 FROM SUBSURFACE WATER IN THE NEVADA DESERT.**
- A E. Loder, S. Antonopoulos and P. Durham, Department of Biology/Jordan Valley Innovation Center, Missouri State University. **IDENTIFICATION OF WINTER FRESHWATER BIOFOULING ORGANISMS ON FLEXIBLE SENSOR SUBSTRATES.**
- A E. Goodwyn, S. Antonopoulos and P. Durham, Department of Biology/Jordan Valley Innovation Center, Missouri State University. **IDENTIFICATION OF SPRING SEASON FRESHWATER BIOFOULING ORGANISMS ON FLEXIBLE SENSOR SUBSTRATES.**
- A C. Punzo, V. Cline, C. Taylor, A. Danner and K. Walton, Department of Biology, Missouri Western State University. **THE EFFECTS OF PREBIOTICS ON THE SUSCEPTIBILITY TO DEXTRAN SODIUM SULFATE-INDUCED COLITIS IN MICE.**
- A J. Lessenger, K. Krueger, M. Adams, M. Flachs, A. Benedict and S. Reardon, Department of Biology, Culver-Stockton College. **ISOLATION, PURIFICATION, AND ANNOTATION OF NOVEL *MYCOBACTERIUM* PHAGE JDOG.**
- A A. Justus, N. Burroughs, R. Frye, J. Kuy, C. Menne, J. Schneider, L. Tinoco, S. Weber and C. Barta, Department of Biology, Missouri Western State University. **A THREE-YEAR SURVEY OF THE RELATIONSHIP BETWEEN NATIVE AND INVASIVE PLANT SPECIES' SUCCESS ON THE JOHN RUSHIN TEACHING AND RESEARCH PRAIRIE AT MISSOURI WESTERN STATE UNIVERSITY.**

- A T. Larison, N. Burroughs, R. Frye, A. Justus, S. Weber and C. Barta, Department of Biology, Missouri Western State University. **PRAIRIE SPECIES' VULNERABILITY TO BIOLOGICAL INVASIONS: VELVET BEAN (*MUCUNA PRURIENS*) SUPPRESSES BIG BLUESTEM (*ANDROPOGON GERARDII*) GROWTH AND DEVELOPMENT.**
- A S. Weber, N. Burroughs, R. Frye, A. Justus, C. Menne, J. Schneider and C. Barta, Department of Biology, Missouri Western State University. **VELVET BEAN SOIL INCLUSIONS ENHANCE THE GROWTH, BIOMASS AND PHOTOSYNTHETIC ASSIMILATION EFFICIENCY IN TOMATO.**
- A T. Eckdahl, M. Mills, and M. Grantham, Department of Biology, Missouri Western State University. **ESTABLISHING AND MAINTAINING APPLIED LEARNING PROGRAMS DURING ADMINISTRATIVE CHANGES.**
- B D. Christopher, C. Punzo, J. Baker and C. Ganong, Department of Biology, Missouri Western State University. **EXPLORING PREVALENCE OF DEER BRAINWORM (*PARELAPHOSTRONGYLUS TENUIS*) IN SNAIL INTERMEDIATE HOSTS USING A NOVEL MOLECULAR TECHNIQUE.**
- B M. Shields¹ and L. Hancock², ¹Division of Science, Math, and Computer Science, Central Methodist University, ²Department of Molecular Biosciences, University of Kansas. **THE *ENTEROCOCCUS FAECALIS* TWO-COMPONENT RESPONSE REGULATOR EtaR CONTRIBUTES TO SALT TOLERANCE.**
- B E. Loder, S. Antonopoulos and P. Durham, Department of Biology/Jordan Valley Innovation Center, Missouri State University. **ORAL PFOS EXPOSURE IS ASSOCIATED WITH GREATER DYSBIOSIS IN ADULT MALE SPRAGUE-DAWLEY RATS COMPARED TO CHANGES IN FEMALES.**
- B L. Carter, R. Mailey, J. Zhu, O. Buschhaus, J. McGhee, A. Campbell and J. Campbell, Department of Natural Sciences, Northwest Missouri State University. **MITOCHONDRIAL DNA VARIATION AND CHYTRID MONITORING OF BULLFROG (*LITHOBATES CATESBEIANA*) POPULATIONS IN NODAWAY COUNTY, MO.**
- B S. Elder, A. Bogdon and M. Grantham, Department of Biology, Missouri Western State University. **USE OF NANOPORE SEQUENCING TO CHARACTERIZE FRESHWATER VIROMES IN URBAN PONDS.**
- B M. Reese, D. di Donto, M. Brown, M. Misner, C. Selk, A. Smallwood and L. Prowant, Department of Biology, Culver-Stockton College. **NATIVE GRASSLAND PROJECT AT CULVER-STOCKTON COLLEGE.**

- B D. Silva Torres, S. Antonopoulos and P. Durham, Department of Biology/Jordan Valley Innovation Center, Missouri State University. **METHOD FOR CRYO-PRESERVATION OF SPINAL CORD TISSUE FROM SPRAGUE-DAWLEY RATS FOR ESTABLISHING PRIMARY CULTURES OF NEURONS AND GLIA.**
- B R. Punzo and T. Roy, Department of Biology, Missouri Western State University. **OUR ONGOING WORK ON THE DOCUMENTATION AND ORGANIZATION OF THE LEO A. GALLOWAY HERBARIUM.**

MISSOURI ACADEMY OF SCIENCE

Chemistry Section

Agenstein Hall Room 124

<u>TIME</u>	<u>AUTHOR/TITLE OF ORAL PRESENTATION</u>
1:30	P. Clubb ^a , J. Linson ^a , M. Reyes ^a , E. Horn ^b , and C. Rico ^a , ^a Department of Chemistry and Biochemistry, Missouri State University, ^b Willard High School. INVISIBLE EFFECTS OF PARENTAL EXPOSURE TO CERIUM OXIDE NANOPARTICLES ON RESPONSES OF PROGENY PLANTS EXPOSED TO PERFLUOROCOTANESULFONIC ACID.
1:50	G. August, L. Spence, A. Wisener, L. Gilbert-Saunders, Department of Chemical and Physical Sciences, Missouri Southern State University. METHOD VALIDATION FOR THE SEPARATION OF STEROIDAL COMPOUNDS FOUND IN HERICIUM ERINACEUS USING REVERSE-PHASE HIGH PERFORMANCE LIQUID CHROMATOGRAPHY.
2:10	C.M. Rico, P. Clubb, I. Shakoor, O. Ogundele, N.J. Kirwa, and J. Garland, Department of Chemistry and Biochemistry, Missouri State University. TRANSGENERATIONAL EXPOSURES OF PLANTS TO EMERGING CONTAMINANTS.
2:30	A. Wisener, M. Dezote, G. August, L. Spence, J. McMaster, L. Gilbert-Saunders. Department of Chemical and Physical Sciences, Missouri Southern State University. METAL ANALYSIS OF HERICIUM ERINACEUS BY ATOMIC EMISSION SPECTROSCOPY.
2:50	L. Spence, J. McMaster, G. August, A. Wisener, L. Gilbert-Saunders. Department of Chemical and Physical Sciences, Missouri Southern State University. EXTRACTION METHODS OF HERICIUM ERINACEUS FOR STEROIDAL AND METAL ANALYSIS.
3:10	S. Muller, and B. Dhital, Department of Chemistry, Westminster College. PROBING PHOTOPHYSICAL PROPERTIES OF PORPHYRINS ON GRAPHENE OXIDE.
3:30	K. Lai, R. Herndon, K. Woelk, Department of Chemistry, Missouri University of Science and Technology. REDUCING EXPERIMENTAL TIME FOR NMR ASPHALT PERFORMANCE ANALYSIS.

MISSOURI ACADEMY OF SCIENCE

Chemistry Poster Sessions

Agenstein Hall Second Floor

SESSION

AUTHOR/TITLE OF POSTER PRESENTATION

- A S. Ingoli and M. Singh, Department of Science, Technology and Mathematics, Lincoln University of Missouri. **LATE-STAGE DIVERSIFICATION OF BIOACTIVE MOLECULES USING A SIMPLE HYDRAZINE REAGENTS.**
- A M. Fakunle, R. Pope, C. Rico, Department of Chemistry, Missouri State University. **PERFORMANCE OF PISUM SATIVUM (PEA) ON MARTIAN SIMULANT SOIL.**
- A M. Pohl, Department of Art and Design, Missouri State University. **PASSIVE ALKALINE SOAKING FOR DESALINATION OF CORRODED CAST IRON STOVE PARTS.**
- B I. Shakoor, R. Biagioni, F. Wang, C. Rico, Chemistry and Biochemistry Department, Missouri State University. **ADSORPTION CAPACITY OF PERFLUOROOCTANESULFONIC ACID WITH CERIUM OXIDE AND MAGNESIUM OXIDE NANOPARTICLES.**
- B K. Frey, Department of Art and Design, Missouri State University. **REMEDIATION OF CORROSION ON EXCAVATED IRON OBJECTS.**
- B E. Elliot-Lee, Department of Art and Design, Missouri State University. **MATERIALS AND PROCESSES FOR RESTORATION OF BADLY DAMAGED OIL-ON-CANVAS PAINTINGS.**

MISSOURI ACADEMY OF SCIENCE

Computer Science & Mathematics Section

Agenstein Hall Room 119

TIME

AUTHOR/TITLE OF ORAL PRESENTATION

- 1:30 Jeremy Smith, Guy Colado, Sunvy Tong, Tomas Jagar, Sylvester Orimaye, College of Global Population Health, University of Health Sciences and Pharmacy in St. Louis. **DETECTING DEPRESSION FROM EEG DATA USING ARTIFICIAL INTELLIGENCE TECHNIQUES**
- 2:00 B. Walker, Y. Liu, Actuarial Science, Maryville University. **TEXT MINING IN COVID-19 TWEET SENTIMENT.**

MISSOURI ACADEMY OF SCIENCE

Computer Science & Mathematics Poster Sessions

Agenstein Hall First Floor

SESSION

AUTHOR/TITLE OF POSTER PRESENTATION

- A N. Fonseca^a, J. Goddard^b, A. Henderson^c, D. Nichols^c, and R. Shivaji^c, ^aDepartment of Mathematics, Actuarial Science, and Statistics, University of Central Missouri, ^bDepartment of Mathematics, Auburn University at Montgomery, ^cDepartment of Mathematics and Statistics, University of North Carolina Greensboro. **EFFECTS OF MATRIX HETEROGENEITY ON POPULATION PERSISTENCE.**

MISSOURI ACADEMY OF SCIENCE

Conservation Section

Remington Hall Room 217

TIME

AUTHOR/TITLE OF ORAL PRESENTATION

- 1:30 A. Reichert¹, Y. Ge², G. Bai², and M. Murad², ¹Department of Biological Sciences, Central Methodist University, ²Department of Biological Systems Engineering, University of Nebraska-Lincoln, Lincoln. **HIGH-THROUGHPUT PHENOTYPING ANALYSIS OF SOYBEAN PHOTOSYNTHETIC CAPACITY VIA LEAF HY-PERSPECTRAL DATA AND MACHINE LEARNING.**
- 1:50 M. S. Mills¹, D. M. Drake², A. Elias¹, C. Ganong¹, M. L. Grantham¹, K. A. Koy¹, and K. L.W. Walton¹, ¹Department of Biology, Missouri Western State University, ²Department of Geography & Environmental Sustainability, University of Oklahoma. **A UNIQUE, POND-FOCUSED INTERDISCIPLINARY RESEARCH TEAM FOR UNDERGRADUATE EDUCATION.**
- 2:10 T. Cook and T. Roy, Department of Biology, Missouri Western State University. **WHAT'S TRENDING? AN INVESTIGATION OF PRAIRIE DICOTS USING OCCUPANCY MODELING AND TRANSECT SURVEYS.**
- 2:30 M. S. Mills and E. Sweet, Department of Biology, Missouri Western State University. **A LONG-TERM STUDY OF AN URBAN TURTLE METAPOPULATION.**

MISSOURI ACADEMY OF SCIENCE

Conservation Poster Sessions

Agenstein Hall Second Floor

SESSION

AUTHOR/TITLE OF POSTER PRESENTATION

- A C. Chevalier. Department of Biology, Missouri Western State University. **STUDENT ORGANIZATIONS CAN BE IMPORTANT PROFESSIONAL DEVELOPMENT VEHICLES FOR APPLIED LEARNING EXPERIENCES: THE MWSU STUDENT CHAPTER OF THE WILDLIFE SOCIETY EXAMPLE.**
- A J. Olberg¹, J. Gelhaus², B. Stephens³, B. Landwer⁴, and W. Mabee¹, ¹Missouri Department of Conservation, Central Regional Office and Conservation Research Center, ²Academy of Natural Sciences, Drexel University, ³Missouri Department of Conservation, Ozark Region Office, ⁴Missouri Department of Conservation, Northeast Region Office. **A NEW CRANEFLY (DIPTERA: TIPULIDAE) RECORD FOR MISSOURI.**
- B T. Wilson, C. Burandt, and A. Newton, Department of Biology, Missouri Western State University. **VIDEO MONITORING TO OBSERVE POLLINATORS IN A RECONSTRUCTED TALLGRASS PRAIRIE.**

MISSOURI ACADEMY OF SCIENCE

Geography Section

Agenstein Hall Room 323

TIME

AUTHOR/TITLE OF ORAL PRESENTATION

- 1:30 A. Batmunkh and C. Blodgett, Department of Geography, University of Missouri – Columbia. **U-NET ARCHITECTURES FOR IMPERVIOUS SURFACES SEGMENTATION FROM HIGH-RESOLUTION AERIAL IMAGERY.**
- 1:50 T. Thomas and G. Elliott, Department of Geography, University of Missouri – Columbia. **VARIABILITY IN OAK AND MAPLE AUTUMN TREE PHENOLOGY ACROSS OAK-HICKORY STANDS IN ROCK BRIDGE STATE PARK, COLUMBIA, MISSOURI.**

MISSOURI ACADEMY OF SCIENCE

Geography Poster Sessions

Agenstein Hall First Floor

SESSION

AUTHOR/TITLE OF POSTER PRESENTATION

- A S. Tuck, Department of Geography, Geology and Planning, Missouri State University. **NOT TOO SMALL TO MAKE A DIFFERENCE: NATURAL RESOURCE EDUCATION IN ZAMBIAN PRIMARY SCHOOLS.**

MISSOURI ACADEMY OF SCIENCE

Geology & Geosciences Section

Agenstein Hall Room 326

<u>TIME</u>	<u>AUTHOR/TITLE OF ORAL PRESENTATION</u>
1:30	D. Schmidt and L. Vanek, Department of Environmental Science and Geology, Westminster College. EXPERIMENTAL TAPHONOMY: DETERMINING POSSIBLE LEAF DEGRADATION OF FOSSIL PLANT ASSEMBLAGE.
1:50	M. Waterman and K. Mickus, School of Earth, Environment, & Sustainability, Missouri State University. MAGNETIC AND GRAVITY ANALYSIS AND CRITICAL MINERAL EXPLORATION IN THE NORTHWEST SUPERIOR PROVINCE, MINNESOTA.
2:10	H. Sadiq, J. Adams, H. Ali, J. Smith, J. Woodard, J. Burris, and S. Orimaye, College of Global Population Health, University of Health Sciences and Pharmacy in St. Louis. DEVELOPING FLOOD MITIGATION STRATEGIES USING AN INCIDENT REPORTING SYSTEM AND ARTIFICIAL INTELLIGENCE FOR UNIVERSITY CITY, MISSOURI.
2:30	S. Abdullah ^{1,2} and A.Y. Kwarteng ² , ¹ School of Earth, Environment, & Sustainability, Missouri State University, ² Geological Engineering Department, University of Mine and Technology, Ghana. MINERAL EXPLORATION OF HYDROTHERMAL ORE DEPOSITS USING REMOTE SENSING IN THE ASHANTI BELT..
2:50	C.E. Boston, Department of Social and Behavioral Sciences, Lincoln University. ARCHAEOLOGICAL EVIDENCE OF CHANGING AGRICULTURAL TECHNOLOGY AND PRODUCTION AT THE DON CARLOS (HISTORIC SITE).

MISSOURI ACADEMY OF SCIENCE

Geology & Geophysics Poster Sessions

Agenstein Hall First Floor

SESSION

AUTHOR/TITLE OF POSTER PRESENTATION

- A J. Goforth and D. Schmidt, Department of Biology and Environmental Science, Westminster College, Fulton, MO. **PETROGRAPHIC ANALYSIS OF PALEOZOIC STRATA, SOUTHEAST CALLAWAY COUNTY, MISSOURI.**
- A F. Mcroberts, and D. Schmidt, Department of Biology and Environmental Science, Westminster College. **DETERMINING VERTEBRAL POSITION ALONG THE AXIAL SKELETON OF A NEW CERATOPSID FROM GRAND RIVER NATIONAL GRASSLANDS, SOUTH DAKOTA.**
- A D. Rosales-Foster, E. Siebert, D. Schmidt, Department of Environmental Science, Westminster College. **BRACHIOPOD ABUNDANCES AND DIVERSITY OF THE MIDDLE CREEK MEMBER: AN INTERPRETATION OF ENVIRONMENTAL CONDITIONS.**
- B H. Weakley¹, O. Adojoh^{1,3}, K. Haberyan¹, Y. Zhang², and S. Beverly³. ¹Department of Natural Sciences, Northwest Missouri State University, ²University of Southern California, and ³Case Western Reserve University. **HOLOCENE PALEOCLIMATE AND PALEOECOLOGICAL RECONSTRUCTION OF THE CENTRAL BASIN, LAKE ERIE: NEW INSIGHTS FROM DIATOMS AND POLLEN**
- B B. Parthasarathy and M. McKay, School of Earth, Environment, & Sustainability, Missouri State University. **GEOLOGY OF BARTON QUADRANGLE, ALABAMA AND PROVENANCE OF HARTSELLE SANDSTONE USING GEOCRONOLOGY.**

MISSOURI ACADEMY OF SCIENCE

Physics and Engineering Section

Remington Hall Room 117

<u>TIME</u>	<u>AUTHOR/TITLE OF ORAL PRESENTATION</u>
1:30	S. Cope, A. Baran, Department of Physics, Astronomy and Material Science, Missouri State University. A PHOTOMETRIC SURVEY OF VARIABLE STARS IN THE OPEN CLUSTER NGC 188.
1:50	G. Vatrano, Department of Physics, Astronomy, and Materials Science, Missouri State University. EFFECTS OF ANNEALING IN A REDUCING ATMOSPHERE ON LITHIUM COBALT OXIDE.
2:10	Nga Nguyen, Religion Department, Missouri State University. BUDDHIST PHILOSOPHY AND QUANTUM PHYSICS.

MISSOURI ACADEMY OF SCIENCE

Physics and Engineering Poster Sessions

Agenstein Hall First Floor

SESSION

AUTHOR/TITLE OF POSTER PRESENTATION

- A S. Girn, S. Morrison, C. Witt, M. Guerra Toro, Department of Physics Astronomy and Materials Science, Missouri State University. **OUTCOMES OF SUPER-EARTH FORMATION IN THE PRESENCE OF A JUPITER-LIKE OUTER PLANET.**
- B B. Devkota, S. Morrison, S. Cope, Physics, Astronomy and Materials Science Department, Missouri State University, **ORBIT PERTURBATIONS TO HABITABLE ZONE PLANETS FROM A MASSIVE PLANET AT THE PRIMORDIAL WATER ICE SNOWLINE AROUND M STARS AND G STARS.**

MISSOURI ACADEMY OF SCIENCE

Science Education Poster Sessions

Agenstein Hall First Floor

SESSION

AUTHOR/TITLE OF POSTER PRESENTATION

- A E. Allison, Honors Program, Drury University. **PHYSICAL THERAPY TRAINING SINCE THE COVID-19 PANDEMIC: PERCEPTIONS AND SUGGESTIONS FOR CHANGES IN TRAINING.**
- A D. Ashley, Department of Biology, Missouri Western State University. **I MADE MY STUDENTS CRAWL FOR THEIR APPLIED LEARNING EXPERIENCE.**
- A A. Johnson, S. Hall, M. Carty, Department of Culture and Society, Park University. **A GENERATIVE AI LIED ON AN ETHICS CLASSROOM ACTIVITY.**
- B T. Eckdahl, Department of Biology, Missouri Western State University. **GENETICS OF THE DAY: APPLIED LEARNING IN A LECTURE ENVIRONMENT.**
- B M. Mills, D. Ashley, Department of Biology, Missouri Western State University. **WEEKEND FIELD TRIPS AS AN IMPORTANT APPLIED LEARNING COMPONENT OF BIOLOGY COURSES.**

MISSOURI ACADEMY OF SCIENCE

**Social and Behavioral Sciences Section
Concurrent Session A**

Agenstein Hall Room 224

<u>TIME</u>	<u>AUTHOR/TITLE OF ORAL PRESENTATION</u>
1:30	V. Farayola, Department of Political Science, Missouri State University. TRUMP’S POPULISM AND INTERNATIONAL ORGANIZATIONS’ RESILIENCE: A COMPARATIVE STUDY OF THE WORLD HEALTH ORGANIZATION AND THE WORLD TRADE ORGANIZATION.
1:45	E. Oyeniya Department of Political Science. Missouri State University. WILDLIFE AND POLITICS: A COMPARATIVE STUDY OF NIGERIA AND KENYA
2:00	J. Senevey, A. Tabatabai, K. DeBord, Department of Social and Behavioral Sciences, Columbia College. MUXES AND TWO-SPIRITS.
2:15	T. Barrett, Department of Social and Behavioral Sciences, Lincoln University. THE RISK OF A NEW HENRIETTA LACKS? INCREASING AWARENESS ABOUT THE IMPACTS ON THE CONSUMER BECAUSE OF DIRECT-TO-CONSUMER GENETIC TESTING IN A U.S.-CENTRIC SETTING.
2:30	C. Fields, Psychological Science Department, University of Central Missouri. STRESS IN AVIATION EDUCATION: A COMPARATIVE ANALYSIS OF COLLEGE STUDENTS.
2:45	J. Larimore, Department of Behavioral Sciences, College of the Ozarks. SEXUAL DIFFERENTIATION IN THE DEVELOPMENT OF THE BRAIN AND NERVOUS SYSTEMS.
3:00	H. Koester and J. Elliott, Department of Psychology, College of the Ozarks. MECHANISMS OF VARIOUS BRAIN INJURIES LITERATURE REVIEW.
3:15	S. Smith, Department of Behavioral Sciences, College of the Ozarks. NEURODEGENERATIVE DISORDERS IN RELATION TO SLEEP DISORDERS AND PREVENTATIVE MEASURES.

MISSOURI ACADEMY OF SCIENCE

Social and Behavioral Sciences Section
Concurrent Session B

Agenstein Hall Room 324

<u>TIME</u>	<u>AUTHOR/TITLE OF ORAL PRESENTATION</u>
1:30	I. Durbin and M. Botta, Department of Behavioral Science, College of the Ozarks. EXPLORING THE IMPACT OF ATTACHMENT STYLES ON COLLEGE STUDENTS' PERCEPTION OF GOD: A SURVEY STUDY.
1:45	L. Fincher and N. Meeks, Department of Behavioral Science, College of the Ozarks. COUNTRY MUSIC REDUCES STRESS IN RURAL COLLEGE STUDENTS.
2:00	T. Tull, and O. Janssen, Department of Human and Social Services, College of the Ozarks. A PROPOSED STUDY ON THE IMPACT OF A PEER GROUP ON ADOLESCENT IMPULSIVITY AND AT-RISK BEHAVIOR.
2:15	B. Bartels, N. Lightfoot, K. A. Braitman, Department of Psychological Science, William Jewell College. IMPACT OF A GENERAL EDUCATION COURSE ON STUDENT WELLBEING.
2:30	K. D. Hendrix ^a , N. Cowan ^b , and B. DuValla ^a . Division of Behavioral Sciences, ^a Southwest Baptist University, ^b Department of Psychological Sciences, University of Missouri-Columbia. EXPLORING THE BOUNDARIES OF ATTRIBUTE AMNESIA: CAN AN INTERVENING TASK MODIFY HOW MUCH IS FORGOTTEN?
2:45	A. Ireland, School of Education and Social Sciences, Missouri Valley College. FACTORS RELATED TO PERCEPTION OF CRIMINALS.
3:00	D. Cole, School of Education and Social Sciences, Missouri Valley College. LISTENING FOR CLUES: CORRELATIONAL STUDY ON MENTAL HEALTH AND MUSICAL EXPERIENCES.
3:15	A. Walker, Department of Psychological Sciences, University of Central Missouri. THE EFFECTS OF TIME PERCEPTION ON ANXIETY IN RESEARCH ARTICLE EVALUATION.
3:30	L. Day, School of Education and Social Sciences, Missouri Valley College. THE RELATIONSHIP BETWEEN FAMILY STRUCTURE AND SUBSTANCE USE.

MISSOURI ACADEMY OF SCIENCE

Social and Behavioral Sciences Poster Sessions

Agenstein Hall Third Floor

SESSION

AUTHOR/TITLE OF POSTER PRESENTATION

- A M. Aguiar, School of Education and Social Sciences, Missouri Valley College. **DOES GROWING UP IN AN UNSTABLE ENVIRONMENT MAKE KIDS MORE AGGRESSIVE?**
- A C. Arnold, K. Davis, A. Zeff, and A. Dillon, Department of Psychology, Central Methodist University. **EXAMINING DIFFERENCES IN BURNOUT AMONG COLLEGE STUDENTS.**
- B R. Battini, School of Education and Social Sciences, Missouri Valley College, **SLEEP AND ACADEMIC PERFORMANCE.**
- B K. Bradley-Robinson, School of Education and Social Sciences, Missouri Valley College, **THE IMPACT OF PARENTING STYLES ON COLLEGE STUDENTS ACADEMIC ACHIEVEMENT AND MENTAL WELL-BEING.**
- A M. Burrell, A. Larson, E. Bolling, and T. LaPonsie, Department of Psychology, Saint Louis University. **PERFORMANCE-BASED SELF-ESTEEM AND SOCIAL COMPARISON'S EFFECT ON BURNOUT IN UNDERGRADUATE STUDENTS.**
- A J. Dangerfield, School of Education and Social Sciences, Missouri Valley College. **SOCIOECONOMIC STATUS & SUPPLEMENTARY EDUCATION IN RELATION TO EDUCATIONAL OUTCOMES.**
- B J. Davis, Department of Art and Design, Missouri State University. **PRESERVING HISTORY AND CULTURE: 19TH-CENTURY INFANT AND CHILD GRAVESTONES.**
- B S. Davis, Department of Psychological Science, University of Central Missouri. **MUSICAL GENRE'S IMPACT ON WORKING MEMORY.**
- A M. Douglas, C. Holles, J. Bowen, S. Turner, L. Kempf, and S. Hernandez, S. Department of Psychology, Missouri Western State University. **SEAT-SEEKING BEHAVIOR: A PERSONALITY CHAIR-ACTER STUDY AMONG COLLEGE STUDENTS.**

- B C. Genseal, P. Foreman, M. Paszkiewicz, and A. Runyan, Ph.D., Department of Psychological Science, University of Central Missouri. **NAVIGATING BIAS: DOES THE PRESENCE OF BIOLOGICAL FEEDBACK DURING IMPLICIT BIAS TRAINING IMPROVE TRAINING EFFICACY?**
- B M. Hirst, Department of Culture & Society, Park University. **DO YOU SEE WHAT I SEE: PAREIDOLIA.**
- B D. Isernhagen, Department of Social Science, Missouri Valley College. **THE USE OF CELLPHONES AND HOW IT AFFECTS ATHLETIC AND ACADEMIC PERFORMANCE IN A COLLEGE ENVIRONMENT.**
- A C. Marsh, School of Education and Social Sciences, Missouri Valley College. **THE RELATIONSHIP BETWEEN STUDENT-ATHLETE EXPERIENCES AND ACADEMIC PERFORMANCE.**
- B M. Martin, and P. Scott, Psychology Department, Rockhurst University. **DESCRIBING ATHLETE BURNOUT FOR IN SEASON AND OUT OF SEASON FEMALE STUDENT ATHLETES.**
- A S. Mathis, Department of Culture and Society, Park University. **POSTER PRESENTATION OF DISRUPTIVE MOOD DYSREGULATION DISORDER: A CASE OF IRRITABILITY, ANGER, AND TEMPER IN CHILDREN.**
- A B. Miranda Guerra, K. Sherman-Wilkins, Department of Sociology, Anthropology, and Gerontology, Missouri State University. **UNDERSTANDING CANNABIS CONSUMPTION PATTERNS IN MISSOURI: AN ANALYSIS OF AN ILLEGAL MARKET IN A LEGAL STATE.**
- A M. Newton, Department of Sociology, Anthropology and Gerontology, Missouri State University. **MAIZE-CENTRISM: ON COOKING AND CONSUMPTION IN EASTERN AND SOUTHERN PROVINCES OF ZAMBIA.**
- B J. Palsis, Department of Education and Social Sciences, Missouri Valley College. **STUDENT DEBT AFFECTING COLLEGE STUDENTS ACADEMIC PERFORMANCE & MENTAL HEALTH.**
- B H. Papendick, A. Wildes, N. Abusoud, I. Fricke, and K. Kiddo, Department of Psychology, Saint Louis University. **EXPLORING AUTONOMY SUPPORTIVE PARENTING AND COMMUNICATION'S IMPACT ON COLLEGE STUDENTS.**
- A K. Parrish, J. Gill, P. Tallapragada, K. Kiddoo, and I. Fricke, Department of Psychology, Saint Louis University. **EFFECTS OF PERSONAL CHARACTERISTICS ON VICTIM BLAMING.**

- A A. Penn, M. Smith, Department of Psychological Sciences, University of Central Missouri. **TIME PERCEPTION AND MEDIA.**
- B F. Rodriguez Lopez, and M. Willis, Department Sociology and Anthropology, Missouri State University. **GROWTH AND MORBIDITY AMONG 6TH – 7TH GRADE STUDENTS IN EASTERN & SOUTHERN PROVINCES OF ZAMBIA.**
- A J. Rosecrans, Department Sociology and Anthropology, Missouri State University. **THE SEEDS WE SOW: FARMING AND GROWTH AMONG PRIMARY SCHOOL CHILDREN IN ZAMBIA.**
- A S. Sampson, and K. Sherman-Wilkins, Department of Sociology Anthropology and Gerontology, Missouri State University. **MICROAGGRESSIONS, DISCRIMINATIONS, AND MENTAL HEALTH AMONG BLACK COLLEGE STUDENTS: THE ROLE OF RACE CENTRALITY IN SCHOOL CONTEXT.**
- A E. Tiefenbrunn, I. Allen, M. Durham, R. Troyer, & A. C. Runyan, Ph.D., Department of Psychological Science, University of Central Missouri. **IMPLICIT BIAS TRAINING: DO PHYSIOLOGICAL RESPONSES DIFFER BETWEEN THOSE WHO HAVE AN IMPLICIT RACIAL BIAS AND THOSE WHO DO NOT?**
- B K. Uphoff and B. Rodgers, Department of Sociology, Anthropology, and Gerontology, Missouri State University. **CLUBBING AT MISSOURI STATE UNIVERSITY, ANTHROPOLOGY-STYLE.**
- B S. Valentin, B. Buttolph, R. Mink, T. Daniels, S, Yager, and C. James, Department of Psychology, Missouri Western State University. **PERSONALITY TRAITS AND EXPERIENCE OF STRESSORS DURING AND AFTER THE COVID-19 PANDEMIC.**
- A Y. Van Cleemput, School of Education and Social Sciences, Missouri Valley College. **THE EFFECT OF MUSIC ON COLLEGE STUDENTS' CLASSROOM PERFORMANCE.**
- B A. Walker and L. Schulte, Department of Psychological Science, University of Central Missouri. **WHEN WORKING MEMORY DOESN'T WORK: NEURAL DEFICITS IN INDIVIDUALS WITH ADHD.**
- B N. Weaver, Department of Sociology, Anthropology, and Gerontology, Missouri State University. **THE IMPACT OF SOCIAL MEDIA ALGORITHMS ON BLACK ARTISTS THROUGH A BLACK FEMINIST LENS.**

Section Abstracts

Agriculture Section

Oral Presentations:

A. Reichert¹, Y. Ge², G. Bai², and M. Murad², ¹Department of Biological Sciences, Central Methodist University, ²Department of Biological Systems Engineering, University of Nebraska-Lincoln. **HIGH-THROUGHPUT PHENOTYPING ANALYSIS OF SOYBEAN PHOTOSYNTHETIC CAPACITY VIA LEAF HYPERSPECTRAL DATA AND MACHINE LEARNING.** Using high-throughput phenotyping techniques will help increase agricultural productivity. Photosynthesis is an important natural process in plants that can convert solar energy into food, feed, fiber, and fuel, which is vitally important for the survival and prosperity of humanity and society. The goal of the research is to develop and validate a rapid non-destructive method for estimating the photosynthetic capacity of soybeans. Experimental data was collected from four soybean plots with a Li-COR 6400xT and an ASD spectrometer, for two photosynthetic parameters ($V_{c,max}$ and J_{max}) and leaf hyperspectral reflectance, respectively. Partial least squares regression models will be developed to predict $V_{c,max}$ and J_{max} from the leaf hyperspectral data.

Poster Presentations:

R. Gorden, K. Weston, K. Pierson, T. Kaullen, S. Thapa. Department of Agriculture, University of Central Missouri. **EVALUATION OF SITE-SPECIFIC SOILS FOR OPTIMIZING SOYBEAN GROWTH AND YIELD.** Healthy soil stores and provides water and nutrients to the growing plants. Despite the same soil type and small field size (even <1 acre), crop yield does not remain constant throughout the field. Crop yield can differ within a field based on the location (edge vs the middle of the field, and tree line areas) and hence there is an increasing adoption of variable rate technology (VRT) in precision agriculture today. The objective is to evaluate the site-specific soils in terms of soybean seed germination, plant growth, and yield under the controlled environment of a greenhouse. The experimental design is a split-plot design with three replications. Two soybean hybrids are grown in plastic pots filled with soils from three locations (edge, center, tree-line) within the same field of about 3 acres. The results of comparing different treatments on seed germination rate, leaf chlorophyll content, plant height, and leaf number will be presented at the MAS meeting.

W. King, T. Kaullen, K. Pierson, R. Gordan, and S. Thapa, Department of Agriculture, University of Central Missouri. **EVALUATION OF SITE-SPECIFIC SOILS FOR OPTIMIZING SOYBEAN GROWTH AND YIELD.** Healthy soil stores and provides water and nutrients to the growing plants. Despite the same soil type and small field size (even <1 acre), crop yield does not remain constant throughout the field. Crop yield can differ within a field based on the location (edge vs the middle of the field, and tree line areas) and hence there is an increasing adoption of variable rate technology (VRT) in precision agriculture today. The objective is to evaluate the site-specific soils in terms of soybean seed germination, plant growth, and yield under the controlled environment of a greenhouse. The experimental design is a split-plot design with three replications. Two soybean hybrids are grown in plastic pots filled with soils from three locations (edge, center, tree-line) within the same field of about 3 acres. The results of comparing different treatments on seed germination rate, leaf chlorophyll content, plant height, and leaf number will be presented at the MAS meeting.

C.A. Lloyd^a, K.W. Lovercamp^a, L.A. Walter^b and T.R. Parks^b, ^aDepartment of Agriculture, University of Central Missouri, ^bMerck Animal Health. **PARASITE EVALUATION OF YOUNG BEEF CATTLE IN WEST CENTRAL MISSOURI.** Cattle produced in the Midwest are exposed to a number of internal parasites that suppress the immune system and reduce feed intake, ultimately decreasing production. The purpose of this research was to evaluate the prevalence of parasites that affect young beef cattle in west central Missouri. Sample collection from nine cattle operations occurred once in late spring and once in early fall of 2022. Golf ball sized fecal samples were collected from twenty calves directly from fresh fecal pats, placed in individual plastic bags and refrigerated overnight. The chilled samples were shipped with ice packs to the assigned Merck Animal Health laboratory. The eggs present in all fecal samples were counted and identified as different gastrointestinal parasites found in ruminants. In the spring collection period, there was a mean +/- standard error (avg +/- std err.) of 15.7 +/- 3.5 eggs per 3 grams. In the fall collection period, there was an average +/- standard error of 49.6 +/- 13.1 eggs per 3 grams. A T-test analysis found that the spring collection period had a lower (P=0.02) number of eggs compared to the fall collection period. These results suggest that parasite worm eggs increased throughout the grazing season and treatment regimens need to be developed to address the increase.

J. Switzer, C. Fowler, M. Bailey, and S. Thapa, Department of Agriculture, University of Central Missouri. **EFFECT OF ZINC AND IRON FERTILIZERS IN SOFT RED WINTER WHEAT GERMINATION AND TILLER FORMATION.** In crop production today, producers are looking for ways to improve their yield at harvest. There are many ways to go about this like adding chemical fertilizers and organic matter. As a general practice, growers will run routine soil tests on different areas of their fields to know what is in the soil. The routine tests consist of measuring the levels of macronutrients such as Nitrogen (N), Phosphorus (P), Potassium (K), and soil organic matter and soil pH. When the routine tests are run, the levels of the micronutrients that are in the soil are not tested. However, inadequate supply or availability of micronutrients such as Iron (Fe) and Zinc (Zn) significantly affects crop growth and yield. To compare the effect of different fertilizer combinations (N only, N+P+K, N+P+K+Zn, N+P+K+Fe, N+P+K+Zn+Fe) in wheat germination and tiller formation, an experiment has been conducted in the UCM greenhouse. Two winter wheat (*Triticum aestivum L.*) cultivars are planted in plastic pots filled with surface packing clay (10 seeds per pot). The experimental design is a split-plot design with three replications. Preliminary findings will be presented in the meeting. Results will empower growers to strategically plan for a well-balanced fertilizer application, thereby enhancing seed germination, plant growth, and yield.

S. Thapa, B.A. Stewart, and Q. Xue, Department of Agriculture, University of Central Missouri. **MANIPULATING PLANTING GEOMETRY TO IMPROVE MICROCLIMATE AND GRAIN YIELD IN CORN.** Water scarcity and drought are the most important environmental factors limiting crop yield worldwide, which is also true in many parts of the United States. The selection of an appropriate planting geometry is important for determining crop yield under water-limited conditions. We conducted greenhouse and field studies consisting of six experiments, to investigate the feasibility of alternative planting geometries for sustainable corn (*Zea mays L.*) production under water-limited conditions. Clump (three plants clustered), cluster (five plants

clustered), and skip-row (one row planted, one row skipped) geometries were tested against the commonly used evenly spaced planting within the row (ESP) geometry. Harvest index (HI) for alternative geometries was significantly higher (10–18%) compared to regular geometry in all experiments. Grain yield was higher (5–25%) for alternative geometries in four of six experiments, while 100 kernel weight for alternative geometries was significantly higher (2-10%) in all experiments. Further, plants in clumps and clusters had 3-5 °F cooler canopy temperature (CT) than plants in alternative geometries during the hottest part of the day. Although alternative geometries did not always increase the yield, reduced CT, and increased HI and kernel weight associated with the alternative geometries may help to reduce corn production risk under drought conditions.

Biochemistry, Biomedicine, & Biotechnology Section

Oral Presentations:

M. Bigelow, K. Meek, C. Duncan, C. Coleman, L. Kovacs, Department of Biology, Missouri State University. **DEFENSE RESPONSE OF *VITIS RUPESTRIS* INDUCED BY THE INSECTICIDE CARBARYL.** Carbaryl is an acetylcholine esterase inhibitor-type insecticide used for pest control on grapevine. We repeatedly observed the occurrence of interveinal leaf necrosis following carbaryl spray application in an F1 hybrid grape progeny under both Missouri and New York field conditions. RNA-seq analysis at 24, 48, and 72 hours carbaryl post-treatment revealed a significant increase in the expression of the key immune regulators *EDS1* and *SAG101*, which are part of the salicylic acid (SA)-mediated defense pathway and hypersensitive reaction. The greatest change in *EDS1* and *SAG101* transcription occurred from 0 to 24 hours, during which time *EDS1* and *SAG101* were upregulated 1.97-fold and 2.04-fold ($p < 0.01$), respectively. In addition, genes for pathogenesis-related proteins and secondary metabolite synthesis also were upregulated 3 to 60-fold, but not in insensitive plants. Interestingly, the expression of several defense-related genes was also upregulated. For example, the expression of jasmonate-induced oxidase 1 and ethylene-response factor C3 increased 2 to 7-fold, respectively. Insensitive plant changes in gene expression occurred in primarily 24 hours post-treatment, after which they regressed to baseline. This pattern of transcriptome changes led us to conclude that sensitive plants experience carbaryl exposure as a stressor. Previous QTL analyses repeatedly mapped this trait to chromosome 16 of the female parent; however, none of the transcriptionally upregulated genes mapped to this location. We hypothesize that this region may encode a receptor that mistakes carbaryl for a pathogen-associated molecular pattern and activates a defense response which leads to a hypersensitive reaction. This project was supported by NSF-PGRP award #1546869.

J. Cox and J. Smith, Department of Biomedical Sciences, Missouri State University. **THE EFFECTS OF THE OVEREXPRESSION OF *RAD51* AND *DMC1* ON GENOMIC STABILITY IN *TETRAHYMENA THERMOPHILA*.** DNA double-strand breaks can occur through various endogenous and exogenous agents, and when not repaired can cause harmful genomic rearrangements and mutations. Two RecA homologs, Dmc1 and Rad51, work to repair DNA double-strand breaks (DSBs) within the cell through the recombination of homologous sections of DNA. While Dmc1 works to repair programmed DSBs through meiotic recombination, Rad51 functions to repair both meiotic and non-meiotic DSBs through the process of homologous recombination (HR). A hyper-recombinant phenotype is often seen in cancer cells due to the overexpression of *RAD51*, leading to chemotherapeutic drug resistance, cancer cell proliferation, and an overall poor patient outcome. To work to prevent this issue, further research is being conducted on the function of Rad51. More specifically, it is the goal to determine the role of *RAD51* and *DMC1* in maintaining genomic stability. In the model organism *Tetrahymena thermophila*, an amacronuclear phenotype is observed at elevated growth temperatures (35 °C), when *RAD51* is overexpressed. A complication in the elongation of the macronucleus occurs but DNA synthesis is not halted, resulting in a macronucleus containing up to 5 times the normal genetic content. Cell culturing experiments have been conducted at various temperatures to show that the amacronucleate phenotype is more affected by a change in temperature rather than the temperature itself. Further study between the two RecA homologs will help elucidate how *RAD51* overexpression leads to genomic instability in the cell, giving rise to information that can be used for treatment of aggressive cancers and genetic disease.

K. Franklin and A. Burris, Department of Biology and Environmental Health, Missouri Southern State University. **ISOLATING AND SEQUENCING THE HUMAN HGD GENE FROM CADAVERIC BONE.** Alkaptonuria is a rare autosomal recessive disorder caused by a defect in the HGD gene which codes for homogentisate 1,2-dioxygenase, an enzyme responsible for the breakdown of the amino acids phenylalanine and tyrosine. Failure to completely break down these amino acids results in a buildup of homogentisic acid, a byproduct of the pathway. Accumulation leads to joint stiffness, brittle cartilage, pigmented connective tissue, and blackened urine. Samples from a cadaver presenting with these symptoms was collected in order to extract genomic DNA and sequence HGD to identify and characterize mutations. Bone tissue will be ground in liquid nitrogen and DNA will be extracted using a Qiagen DNA extraction kit. After extraction, the HGD gene, containing 14 exons, will be amplified using PCR and sent out for sequencing to determine mutations. This work provides insight into this rare genetic condition and what mutations lead to the disorder. In addition, it will establish a protocol for isolating DNA from fixed cadaver tissue for use in downstream applications like PCR.

D. Patel, A. Subrash, E. Wagoner, S. Kuhnert, M. Kilmer, A. Barry, Department of Biology and Environmental Health, Missouri Southern State University. **EXPLORING THE CORRELATION BETWEEN CATECHOLAMINERGIC ACTIVITY IN THE CERVICAL VAGUS NERVE AND SIGNS OF CARDIAC REMODELING: IMPLICATION FOR VAGUS NERVE STIMULATION THERAPY.** The process of cardiac remodeling (CR), triggered by heightened sympathetic outflow, involves changes in heart geometry and accumulation of connective tissue (CT) within the myocardium. Simultaneously, parasympathetic outflow, through cardiac branches of the Vagus Nerve (VN), exerts cardioprotective effects, reducing the risk of CR. Recent studies revealed the presence of catecholaminergic fibers (CF) in the cervical VN. These newly discovered CF, likely postganglionic sympathetic, challenge the current understanding. The aim of our study was to explore the correlation between the quantity of CF within the cervical VN and indicators of CR. Cervical VN samples were obtained from 10 formalin-preserved adult human cadavers (male n=5, female n=5), and prepared using Luxol fast blue and anti-Tyrosine Hydroxylase (TH) antibody. Superior Cervical Ganglia were examined for TH-reactivity to confirm the quality of TH detection. TH+ areas and CT were measured using ImageJ and analyzed using PAST 4.11. Analysis revealed the presence of TH+ fibers bilaterally or unilaterally in 9 of 10 examined donors, with varying prevalence ranging from 0% to 15%. Upon conducting linear regression analysis, a trend towards significance emerged in the relationship between the quantity of CF and abnormal thickness observed in the left ventricular wall and interventricular septum ($p=0.056$). Our study reinforced the understanding of the persistent presence of CF within the cervical VN. The findings indicated a lack of correlation, however, several trends for statistical significance were detected. Further investigations with an expanded sample size are warranted to enhance the robustness of our conclusions.

S. Miriyala^a, S. Manikandan^b, V. Manikandan^b, P. Manikandan^c, A. Relan^a, H. Pandaya^a and D. Waszczuk^a, ^aDepartment of Anatomy, AT Still University, ^bKirksville Senior High School, ^cDepartment of Cellular Biology Anatomy, Louisiana State University Health Sciences Center. **AUTOTAXIN-LPA-LPP3 AXIS ON THE BLOOD-BRAIN BARRIER FOLLOWING ACUTE AND CHRONIC ALCOHOL CONSUMPTION.** This study aimed to examine the impact of alcohol on the blood-brain barrier (BBB) through the modulation of the bioactive glycerophospholipid lysophosphatidic acid (LPA) pathway. Utilizing in vivo and in vitro models, we

explored how ethanol consumption influences the BBB via the autotaxin-LPA-Lipid Phosphate Phosphatase(LPP3) axis. Our methods included administering ethanol to mice at doses of 0.7 or 2.8 g/kg, either acutely or chronically, and analyzing NaF extravasation, autotaxin, LPP3, and BBB protein expressions in the cerebral cortex post-90-minute ischemic stroke. Additionally, mouse brain microvascular endothelial cells were exposed to 10 mM or 50 mM ethanol to assess changes in trans endothelial electrical resistance, mitochondrial superoxide production (MSP), and oxygen consumption rate (OCR). Results showed that 2.8 g/kg ethanol significantly increased NaF extravasation, upregulated autotaxin, downregulated BBB proteins and LPP3 ($P < 0.001$), and induced mitochondrial dysfunction. Conversely, 0.7 g/kg ethanol and 10 mM ethanol exposures were found to protect against BBB disruption by reducing MSP. The study concludes that high-dose alcohol consumption disrupts the BBB through oxidative stress and mitochondrial dysfunction, whereas low-dose alcohol may offer protective effects. This research highlights the complex role of alcohol in BBB integrity and the potential therapeutic targets within the autotaxin-LPA-LPP3 axis for preventing alcohol-induced BBB disruption. Supported by KCOM fund/200242

Poster Presentations:

A. Amjed, McQueary College of Health and Human Services, Missouri State University. **MALARIA IN SIXTH AND SEVENTH GRADE SCHOOL CHILDREN OF ZAMBIA'S EASTERN AND SOUTHERN PROVINCES: ON PREVENTION, MORBIDITY, AND GROWTH.** Malaria, a pervasive mosquito-borne disease, poses a critical public health challenge, especially in sub-Saharan Africa, where 94% of global cases occur. Severe malaria can lead to life-threatening complications and chronic infections which, notably in children, can cause stunted growth, cognitive impairment, and anemia. This study, conducted in Zambia's Eastern and Southern Provinces, addresses the complex factors influencing malaria prevalence and preventive measure effectiveness, given the nation's annual 3.5 million cases. The research, under IRB #FY2023-494, involves 6-7th graders (10-21 years) from selected schools, employing observations, interviews with health professionals, and anthropometric assessments. This study has a sample size of 953 participants, consisting of students from five schools across the two provinces. Participants were interviewed about malaria prevention and had anthropometric measurements taken. Handwritten data is transcribed into Excel, and anthropometric data undergoes analysis with WHO's AnthroPlus and Statistica for descriptive and correlational insights. Of the participants, 70% reported a history of malaria, with no significant gender or regional disparities. Upper respiratory and diarrheal diseases were also prevalent, with 81% and 54% of participants reporting history, respectively. Participants with a history of malaria exhibited lower anthropometric measurements, although these findings were not significant. This underscores the continued impact of malaria in Zambia and emphasizes the need for targeted interventions to address its enduring health implications.

A. Borup, Department of Biology, Missouri Southern State University. **A RADIOLOGICAL CASE STUDY HIGHLIGHTING COMMON FINDINGS OF PROSTATE CANCER.** About 1 in 8 men will be diagnosed with prostate cancer in their lifetime. Excluding non-melanoma skin cancer, it is the most commonly diagnosed cancer among men. Despite advancements in screening and treatment, 1 in 44 men die of prostate cancer, making it the second leading cause of cancer-related death in American men, behind only lung cancer. Radiology plays a key

role in diagnosing and monitoring prostate cancer. When reviewing imaging, there are an array of findings that can aid diagnosis, treatment response, and potential complications if the cancer progresses. Being able to identify these findings and understand what they might mean for the patient is critical for proper diagnosis and treatment. This case highlights a patient with known advanced metastatic prostate cancer displaying many of the common and less common associated radiological findings. The goal of this case study is to increase awareness of this common cancer, the associated radiological findings, and the potential complications.

C. Fry, M. Havlicek, A. Hulme, Department of Biomedical Sciences, Missouri State University. **DETERMINING THE ROLE OF SPTBN1 IN HIV-1 UNCOATING.** HIV-1 is the virus that causes acquired immunodeficiency syndrome (AIDS), and currently, there is no cure once an individual is infected. The development of new drugs targeting HIV-1 replication steps is essential for keeping viral levels at a minimum and to prevent further transmission. An attractive replication step for new drug targets is viral capsid uncoating, where the virus loses the protein structure encapsulating the genome. The exact mechanism of capsid uncoating is unknown; however, a few host-cell proteins are of interest for further research specifically, SPTBN1. Recent studies have shown a significant decrease in viral infectivity when this protein is knocked down, yet its role in uncoating has not been characterized. Preliminary data revealed a delay in early time points of uncoating *in vivo* when SPTBN1 was knocked down. Using the cyclosporine washout assay, we aim to determine the role of SPTBN1 in HIV-1 uncoating. We anticipate that understanding uncoating kinetics and the role of host cell factors will open a door for the development of new capsid inhibitors.

D. James and J. Wang, Department of Biomedical Sciences, Missouri State University. **MICROVASCULAR ENDOTHELIAL PERMEABILITY COEFFICIENT REGULATED BY PURINERGIC P2Y₂ RECEPTOR.** As a semi-permeable membrane, the endothelium mediates vascular exchange between the blood and target tissue. Inflammation has a profound effect on increasing endothelial permeability. However, the direct mechanism of changes in permeability to solutes without immune cell mediation is not fully understood. It has been shown *in vivo* that the activation of P2Y₂ receptor (P2Y₂R) within microvascular endothelial cells increases permeability. The goal of this research was to determine the molecular mechanism of P2Y₂R-induced increase in permeability in microvascular endothelial cells (MEC) *in vitro*. Wild type (WT) and P2Y₂R knock out (KO) primary murine MEC were used to measure permeability response to P2Y₂R agonist, uridine triphosphate, stimulation. Transwell Permeable Supports with fluorescence labeled-dextran (70 kD) were used for endothelial permeability experiments, followed by detection with spectrophotometry. Preliminary data has been collected, but has not currently undergone statistical analysis. Identifying the mechanistic involvement of MEC P2Y₂R in permeability change will further the understanding of vascular permeability response during inflammation and will aid in the treatment of a broad group of disorders such as atherosclerosis, diabetes, cancer, and vascular leak syndrome.

C. Knight, J. Wang, Department of Biomedical Biology, Missouri State University. **EFFECT OF P2Y₂ RECEPTORS ON LEUKOCYTE BEHAVIOR UNDER ACUTE INFLAMMATION IN TRANSGENIC MALE MICE IN VIVO.** P2Y₂ receptors, G-protein coupled receptors that span the membrane of cells, play a role in a variety of functions in the body. One

possible role is in the initiation of inflammation. Under non-inflamed conditions, P2Y₂ receptors have been seen to prevent the movement of leukocytes from the vasculature to the surrounding tissue but it is unknown how this may change under inflammation. In this research, the goal is to determine the importance of P2Y₂ receptors on leukocyte-endothelial behavior when in vivo under acute inflammation. To do so, baseline data was established to observe the “normal” interactions between leukocytes and endothelial cells when under non-inflamed condition inflammation is present. Following this, leukocyte interactions were observed after inducing localized acute inflammation with lipopolysaccharide (LPS). From these results, it is expected to see increased recruitment, rolling, and adhesion of leukocytes within LPS wildtype mice compared to the baseline data and knockout LPS mouse groups. If this is the case, it could suggest that the P2Y₂ receptors expression on endothelial cells and leukocytes regulate the leukocyte response during inflammation. We anticipate that with an increased grasp on the P2Y₂ receptor’s role on inflammation, there will be an improved understanding of the initial steps of immune responses. Implications of these findings have the potential to be in clinical, therapeutic, and research applications.

E. Liimatta, E. Schmall, A. Shrestha, A. Carpenter, J. Smith, Department of Biomedical Sciences, Missouri State University **CHARACTERIZATION OF A NOVEL UV RESISTANCE PHENOTYPE IN TETRAHYMENA THERMOPHILA WITH RAD23A**. When Nucleotide Excision Repair (NER) is nonfunctional, such as in the genetic disease Xeroderma Pigmentosum (XP), the risk of skin and eye cancer increases >1000 fold because DNA damage caused by UV radiation is unable to be repaired. The goal of this study is to determine the role of *rad23* in UV resistance in *Tetrahymena thermophila*. This is the first time *rad23* has been studied in *T. thermophila* and previous *rad23* knockdowns in other organisms have shown UV sensitivity rather than resistance. In this study, *rad23* knockdown was confirmed by qRT-PCR, and UV resistance was confirmed by UV survivability assays. Southern blot immunodetection techniques assessed levels of DNA damage in UV treated *rad23* knockdown cells and showed decreased repair. Advancing knowledge of NER, XP and RAD23 will eventually lead to the development of treatments for Xeroderma Pigmentosum disease.

J. Makhoulfi, T. Le, R. Ulbricht, Ph.D., J. Wang, M.D., Ph.D., Department of Biomedical Sciences, Missouri State University. **INVESTIGATING THE EFFECTS OF INFLAMMATION AND P2Y₂ RECEPTOR ACTIVATION ON INSULIN RESISTANCE IN MICE**. Insulin resistance is the body's impaired ability to utilize endogenous and exogenous insulin to take up blood glucose and is associated with many clinical conditions including type 2 diabetes, hypertension, obesity, and cardiovascular disease. The cause of insulin resistance is still unknown; however, it is linked to inflammation. The activation of the purinergic P2Y₂ receptor potentiates an inflammatory response under the pathogenesis of obesity and has adverse effects on glucose metabolism by potentiating insulin resistance. Therefore, the goal of this research is to further investigate the effects of P2Y₂ activation on the downstream signaling pathways of the insulin receptor and glucose uptake. To determine if effects on glucose uptake are specific to the P2Y₂ receptor, male WT and female WT and P2Y₂^{-/-} mice are treated with LPS, UTP, and glucose challenges. We are performing glucose tolerance testing (GTT) to measure response to glucose under the influence of the P2Y₂ receptor. We are also measuring the expression of the insulin receptor and glucose transporter from skeletal muscle and adipose tissue in these mice. Current

data supports that the glucose tolerance of female mice is not affected by P2Y₂ receptor expression, while male WT mice displayed a reduced glucose tolerance when treated with LPS. We expect that glucose transporter and insulin receptor expression will be increased in female mouse tissues compared to male mice. This research aims to investigate the molecular mechanism of insulin resistance development and aims to give insights into potential targets of type 2 diabetes therapy.

S. R. Moore, C. Lupfer, R. Ulbricht, Department of Biomedical Sciences, Missouri State University. **GLOBAL DNA METHYLATION IN A CRISPR CAS9 MEDIATED KNOCKOUT OF EBP1.** ErbB3-binding protein 1 (EBP1) helps regulate gene expression through various epigenetic modifications and is extremely crucial for embryonic development. EBP1 dysfunction is a known cause of recurrent miscarriages and other developmental diseases. In this study, we first conducted a complete knock-out of EBP1 via CRISPR/Cas9 in Human Embryonic Kidney (HEK-293) cells. After a successful knockout is complete, we will isolate and measured the genomic DNA methylation levels. It is hypothesized that a knockout of EBP1 will cause an increase in global DNA methylation levels due to its interactions with DNMT1, a DNA methyltransferase. This is the first study to conduct an EBP1 knockout in a human model and see the effects on global DNA methylation. In the future, EBP1 will be knocked out in stem cells in order to view the effect of EBP1 on regulation of DNA methylation during differentiation. We anticipate this study to illuminate the molecular mechanism that EBP1 plays in embryonic development and developmental diseases.

N. Nalley, S. Antonopoulos, P. Durham, Department of Biology/ Jordan Valley Innovation Center, Missouri State University. **CHARACTERIZATION OF CALCIUM CHANGES IN RESPONSE TO KCL STIMULATION IN PRIMARY CULTURES OF NEURONS AND GLIA FROM CRYOPRESERVED TRIGEMINAL GANGLIA: EFFECT OF NEURON-GLIA DENSITY.** Migraine and temporomandibular joint disorder (TMD) are prevalent orofacial pain conditions that are characterized by activation of the trigeminal ganglion. The trigeminal ganglion is implicated in the underlying pathology of migraine and TMD since it provides a pain signaling pathway from peripheral tissues in the head and face to the upper spinal cord. Primary cultures of the trigeminal ganglion offer a cell model to identify new therapeutic targets, and to understand the mechanisms involved in disease pathology. The goal of our study was to investigate the effects of neuron and glia density on intracellular calcium levels in cryopreserved trigeminal ganglion primary cultures from neonatal Sprague-Dawley rats. A bovine serum albumin gradient and differential centrifugation was used to separate primary cultures into a mixed population of cells (normal ratio), a neuronally enriched population, and a glial enriched population. Calcium imaging using the fluorescent ratiometric dye Fura-2 was used to determine cellular stimulation in response to 60 μ M KCl. Neuron-enriched and glial-enriched cultures showed greater increases in intracellular calcium levels in response to KCl stimulation compared to the mixed cell population. Findings from our study provide evidence that the magnitude of the calcium increase is dependent on neuron-glia density and supports the notion that neurons modulate the excitability state of glia and glia modulate neuronal excitability. In future studies, trigeminal cultures will be used to study changes in calcium and other ions such as potassium and chloride in response to inflammatory stimuli and anti-inflammatory agents. Funding provided by ERDC W912HZ-23-2-0024.

R. Pecka and A. Hulme, Biomedical Sciences Department, Missouri State University. **STUDYING THE LOCALIZATION OF SPECTRIN β NON-ERYTHROCYTE 1 AND ACTIN IN CHME3 CELLS TO BETTER UNDERSTAND HIV REPLICATION.** Human immunodeficiency virus (HIV) directly attacks a host immune system by infecting and replicating in CD4-presenting immune cells. Like most viral pathogens HIV utilizes cellular machinery to assist in viral entry, transport, and export. One of the components HIV is known to utilize for replication is the actin cytoskeleton. By directly binding to actin or actin-binding proteins, HIV can manipulate structural dynamics within the cell. The way HIV hijacks actin for replication post-viral fusion isn't fully understood, especially during viral transport to the nucleus. In a 2013 study conducted by Dai et al., it was found that lowering expression of cellular protein spectrin β non-erythrocyte 1 (SPTBN1) in macrophages led to HIV-resistant cells along with partial depolymerization of the actin cytoskeleton. The goal of our study is to investigate the role of SPTBN1 in the early stages of HIV replication and localization within CHME3 microglial cells. Through fluorescent microscopy, we were able to visualize SPTBN1 and overall actin structure on CHME3 cells. Our results indicated that there is colocalization between SPTBN1 and actin with 90% of SPTBN1 overlapping with actin. We also found that knockdown of SPTBN1 causes disruption of the actin cytoskeleton. In the future, we will use these techniques to determine if HIV colocalizes with SPTBN1 and actin during early replication steps and the effect of SPTBN1 knockdown on HIV localization. Overall, these results will help to better understand the role host cell proteins have in HIV replication.

C. Punzo, V. Cline, C. Taylor, A. Danner, and K. Walton, Department of Biology, Missouri Western State University. **THE EFFECTS OF PREBIOTICS ON THE SUSCEPTIBILITY TO DEXTRAN SODIUM SULFATE-INDUCED COLITIS IN MICE.** Inflammatory bowel disease (IBD) encompasses two chronic inflammatory diseases of the colon. We induced colitis in eight mice with 8 days of oral administration of 3.5% dextran sodium sulfate (DSS), a widely used animal model of IBD. Seven days before the DSS treatments, four out of the eight mice were treated with fructooligosaccharide (FOS), a prebiotic fiber molecule, in the drinking water to observe whether this altered their susceptibility to subsequent DSS colitis induction. At the end of DSS treatment, colon tissue was collected for RNA analysis and histology, and fecal samples were saved for fecal DNA analysis. Preliminary results from RT-PCR and quantitative PCR for pro-inflammatory cytokines and tight junction proteins indicated that there was not a significant difference between the FOS-treated group and the DSS only group. Fecal DNA RT-PCR analysis revealed no difference in *Lactobacilli* between experimental groups. These findings suggest that FOS may not be beneficial to reduce inflammation in IBD patients.

D. Silva Torres, S. Antonopoulos, P. Durham, Department of Biology/Jordan Valley Innovation Center, Missouri State University. **METHOD FOR CRYOPRESERVATION OF SPINAL CORD TISSUE FROM SPRAGUE-DAWLEY RATS FOR ESTABLISHING PRIMARY CULTURES OF NEURONS AND GLIA.** Primary cultures are used to elucidate cellular and molecular mechanisms involved in disease pathology and modulation by pharmaceuticals and nutraceuticals, and to identify novel therapeutic targets. However, preparation of primary cultures from rodent embryos is labor-intensive, and it can be difficult to produce high-quality consistent cultures. To overcome these issues, cryopreservation can be used to obtain standardized,

high-quality stocks of neuronal cultures. In this study, we present a simplified cryopreservation method for establishing primary cultures of upper spinal cord neurons and glia from Sprague-Dawley neonates, using a 90:10 (v/v) fetal bovine serum/dimethyl sulfoxide cell freezing medium. The Live/Dead Cell Imaging assay was used to determine cell viability of the cultures and immunocytochemistry was used to characterize basal expression of proteins. Cryopreserved spinal cord cells stored for up to one year in liquid nitrogen retained high cell viability and exhibited similar neuronal (NeuN and β -tubulin) and glial cell (vimentin) morphology to fresh cultures. Neuronal and glial proteins implicated in inflammation and pain signaling (CGRP, GFAP, Iba1, GAD 65/67, GABA receptors) were expressed in cell types in agreement with published studies. This method is simple, does not require special reagents or equipment, will save time and money, increase flexibility in study design, and produce consistent cultures. Furthermore, these cultures can be used to study cellular changes in response to inflammatory and anti-inflammatory agents. Funding provided by ERDC W912HZ-23-2-0024.

M. Scharnhorst, S. Antonopoulos, P. Durham, Department of Biology/ Jordan Valley Innovation Center, Missouri State University. **METHOD FOR CRYOPRESERVATION OF TRIGEMINAL GANGLION FOR ESTABLISHING PRIMARY CULTURES OF NEURONS AND GLIA FROM NEONATAL SPRAGUE-DAWLEY RATS.** Primary cultures are used to elucidate cellular and molecular mechanisms involved in disease pathology and modulation by pharmaceuticals and nutraceuticals, and to identify novel therapeutic targets. However, preparation of primary neuronal and glial cultures from rodent embryos is labor-intensive, and it can be difficult to produce high-quality consistent cultures. To overcome these issues, cryopreservation can be used to obtain standardized, high-quality stocks of primary cultures. In this study, we present a simplified cryopreservation method for establishing rodent primary trigeminal ganglion neurons and glia from Sprague-Dawley neonates, using a 90:10 (v/v) fetal bovine serum/dimethyl sulfoxide cell freezing medium. The Live/Dead Cell Imaging assay was used to determine cell viability of the cultures and immunocytochemistry was used to characterize basal expression of proteins. Cryopreserved trigeminal ganglion cells stored for up to one year in liquid nitrogen retained high cell viability and exhibited similar neuronal (NeuN and β -tubulin) and glial cell (vimentin) morphology to fresh cultures. Cryopreserved cells were transiently transfected with reporter genes using the Lipofectamine P3000 Transfection Reagent, and relative light units measured in a luminometer using a luciferase and β -galactosidase assay. This method is simple, does not require special reagents or equipment, will save time and money, increase flexibility in study design, and produce consistent cultures. Funding provided by ERDC W912HZ-23-2-0024.

M. Scharnhorst, D. Silva, D. Aardema Faigh, S. Antonopoulos, P. Durham, Department of Biology/ Jordan Valley Innovation Center, Missouri State University. **THE EFFECTS OF COPPER OXIDE NANOPARTICLES ON GABAERGIC SIGNALING IN NEURONS AND GLIAL CELLS OF PRIMARY TRIGEMINAL GANGLION CULTURES FROM NEONATAL SPRAGUE-DAWLEY RATS.** Heavy metal nanoparticles used in a variety of industries can leach from devices and contaminate the surrounding environment, posing a threat to human health. Divalent copper oxide nanoparticles (CuO NPs) have been reported to be toxic to diverse cell types by causing DNA damage and oxidative stress. The goal of our study was to investigate the effects of CuO NPs on trigeminal ganglion neuronal and glial cell viability, testing the hypothesis that neurons would be more sensitive to CuO NPs. To test our hypothesis,

cryopreserved trigeminal ganglia from neonatal Sprague-Dawley rats were used to establish primary cultures that were incubated overnight with different concentrations of CuO NPs and cell viability was determined. CuO NPs showed greater toxicity in glial cells than in neurons. To better understand CuO NP-induced cell toxicity, expression of anti-inflammatory receptor proteins in the gamma-aminobutyric acid (GABA) pathway were investigated by immunocytochemistry. The expression of the GABAB2 receptor subunit remained unchanged with all concentrations of CuO NPs in glial cells. However, GABAB2 expression was decreased in the neurons with 20 mg/L CuO NPs. The GABAB1 receptor subunit and GABAA receptor expression were decreased in both neurons and glia at the 20 mg/L concentration of CuO NPs. Findings from our study provide evidence that the toxicity seen with CuO NPs in the trigeminal ganglion glia could be due to dysregulation of GABAergic signaling which is reported to inhibit inflammation and minimize toxicity. Funding provided by ERDC W912HZ-23-2-0024.

N. Lumbard and C. Wills, Department of Biology, Rockhurst University. **THE EFFECTS OF CREATINE ON BROWN PLANARIA REGENERATION.** Creatine phosphate is an over-the-counter supplement commonly purchased to increase muscle regeneration. Published work is inconclusive on the effects of creatine for muscle regeneration. To examine the effects of creatine on regeneration rate, we obtained a stock population of Brown planaria from Carolina Biological in January 2023. Planaria were kept in a freshwater aquarium. Experimental planaria were severed into inferior and superior segments of equal length. Alternating head and tail, one half of a single planaria was placed into a petri plate containing the experimental solution while the other half was placed into the control solution. Controls were placed in a solution consisting of 0.45 g of CaCO₃ per 1 L of DI water. Various concentrations of creatine ranging from 0.05 g to .15 g were mixed with the control solution. Each petri plate of solution contained sections of 5 planaria. Plates were observed every 2 days for 1 month. We observed no effects of creatine supplementation on planaria regeneration rates.

Biology Section

Oral Presentations:

C. Barta¹, B. Jenkins¹, D. Lindstrom¹, A. Zahnd¹ and G. Szekely², ¹Department of Biology, Missouri Western State University, ²Department of Biology and Ecology, Babeş-Bolyai University, Cluj-Napoca, Romania. **THE FIRST EVIDENCE OF GIBBERELIC ACID'S ABILITY TO MODULATE TARGET SPECIES' SENSITIVITY TO HONEYSUCKLE (*LONICERA MAACKII*) ALLELOCHEMICALS.** Invasive species employ competitive strategies such as releasing allelopathic chemicals into the environment that negatively impact native species. Decomposing Amur honeysuckle (*Lonicera maackii*) leaves leach various allelopathic phenolics into the soil, decreasing the vigor of several native species. Notable differences in the net negative impacts of *L. maackii* metabolites on target species were argued to depend on soil properties, the microbiome, the proximity to the allelochemical source, the allelochemical concentration, or environmental conditions. This study is the first to address the role of target species' metabolic properties in determining their net sensitivity to allelopathic inhibition by *L. maackii*. Gibberellic acid (GA₃) is a critical regulator of seed germination and early development. We hypothesized that GA₃ levels might affect the target sensitivity to allelopathic inhibitors and evaluated differences in the response of a standard (control, *Rbr*), a GA₃-overproducing (*ein*), and a GA₃-deficient (*ros*) *Brassica rapa* variety to *L. maackii* allelochemicals. Our results demonstrate that high GA₃ concentrations substantially alleviate the inhibitory effects of *L. maackii* allelochemicals. A better understanding of the importance of target species' metabolic properties in their responses to allelochemicals will contribute to developing novel invasive species control and biodiversity conservation protocols and may contribute to applications in agriculture.

D. Curtis and M. Kilmer, Department of Biology and Environmental Health, Missouri Southern State University. **EXTENDED GENERATIONAL EFFECTS OF MICROPLASTIC EXPOSURE ON *DAPHNIA MAGNA*.** Microplastics are an environmental concern and are known to have negative impacts on organisms exposed to them. In freshwater organisms, lethal effects are rare, but sublethal effects exist and have long-term implications. A pilot study in 2023 indicated that offspring produced by plastic-exposed adults were smaller than those produced by control adults. In this study, we attempt to determine the length of effects on *Daphnia magna* across multiple generations. Initially, organisms were exposed to either 0 mg/L or 10 mg/L of microplastics for 21 days, at which point final body size of adults was determined. Offspring were collected from the third brood (~day 14) and either measured microscopically or used to start the next generation of testing. In generations 2+, an additional treatment was added, in which plastic-exposed offspring were reared in clean water, to see if the reduced size effect could be reversed. This process will be repeated for multiple generations to determine the length of generational effects. Initial results indicated that offspring of plastic-exposed adults are significantly smaller than offspring from control adults (0.907 mm vs. 0.942 mm, $p=0.002$), matching results from the pilot study, indicating this is a reliably induced effect. Quantifying the length of the generational effects will be critical to understanding how even very brief exposure to microplastics can have long-term effects on populations.

R. Frye and C. Barta, Department of Biology, Missouri Western State University. **ENHANCING CROP DEFENSE STRATEGIES AND PRODUCTIVITY THROUGH THE UTILIZATION OF BIOGENIC PLANT VOLATILE ORGANIC COMPOUNDS (VOCs) IN AGRICULTURE: A CASE STUDY.** Novel, sustainable approaches exploiting plant-produced metabolites are key for a climate-smart agriculture and for safeguarding food security. Plants allocate a significant amount of their fixed carbon to producing volatile organic compounds (VOCs). VOCs emitted from leaves may serve as natural and eco-friendly solutions to protect plants from stress and improve crop yields. While VOCs have solely been utilized for deterring herbivores, it is important to recognize that their potential applications extend far beyond this limited use. VOCs can protect against stressors, including pathogens and environmental stresses, potential yet untapped for agricultural applications. Our study focused on understanding whether variations in the synthesis and emission of the most abundant plant VOC, isoprene, in response to temperature and light intensity affects the timing of the onset of senescence and benefit plant health in a feedstock-rotation crop, velvet bean (*Mucuna pruriens*), naturally emitting isoprene. Potted plants were grown in a greenhouse at high (39°C;HT), moderately high (30°C;MHT) and low (25°C;LT) daytime temperatures, exposed to either 1100 (high-light;HL) or 400 (low-light;LL) $\mu\text{molm}^{-2}\text{s}^{-1}$ irradiances of photosynthetically active radiation. We found that plants with high isoprene emissions (under HT and HL) showed delayed senescence, likely due to isoprene's antioxidant action neutralizing reactive oxygen species and the priming effect of higher H_2O_2 levels, upregulating the plant's antioxidant network and isoprene emission. Our work demonstrates that the capacity to emit isoprene provides yet untapped developmental, health and fitness benefits to emitter crop species and opens the door for applications in developing climate-smart crops for the future.

E. Gardner, School of Science and Health, William Woods University. **URBANIZATION AND PATHOGENIC INFECTION: AN OBSERVATIONAL STUDY OF INFECTION IN URBAN AND RURAL *PLANTAGO MAJOR* POPULATIONS.** When discussing urbanization's effects on a population, we can see an increase or decrease in infection referred to as the amplification effect and the dilution effect, respectively. Using fungal infections from the *Septoria* genus in *Plantago major*, as a model for urbanization and the amplification effect in flora, this study aims to show the effect of urbanization on pathogenic landscapes. This study measured the infection rates of different *P. major* populations across Boone, Calloway, and Cole counties from August to October. Urban areas were categorized as any place with a population density of over 500 people/ km^2 . Infection rates, density, height, and species richness were measured throughout urban and rural populations. The sampling space was a 400 yd^2 area with three random samples taken within it. Each sample was taken in a 1 yd -by-1 yd area. Sampling occurred over 18 rural and 19 urban areas, with 681 specimens being sampled. Urban areas were more likely to experience infection ($P=0.000047$). Rural areas exhibited higher floral density than urban ($P=0.0048$). No statistical significance existed between species richness ($P=0.8344$), height ($P=0.7372$), or density when compared to infection rate ($P=0.419$). Due to our world becoming rapidly more urban, the effects of urbanization are far-reaching and have been linked to pathogenic infections across multiple tropic levels. This experiment helps quantify the effect of urbanization on infection rates.

R. Jani, K. Franklin, N. Gugnani and A. Burris, Department of Biology and Environmental Health, Missouri Southern State University. **DETERMINING THE EFFECTS OF GLYCEROL AND RAFFINOSE MEDIA ON PROTEASOME LOCALIZATION.** Proteasomes are large, multi-subunit complexes that degrade cellular proteins. Proteasomes consist of two major subcomplexes, the regulatory particle (RP) and the core particle (CP). When yeast (*Saccharomyces cerevisiae*) cells are deprived of nutrients like glucose or nitrogen, proteasomes leave the nucleus. Glucose starvation causes proteasomes to coalesce into foci in the cytoplasm called proteasome storage granules (PSGs). Under nitrogen starvation, the proteasomes are sent to the vacuole for degradation. When starved of both, proteasomes enter PSGs. This study aims to determine whether proteasomes are sent to PSGs or the vacuole when cells are initially grown in a carbon source other than glucose (YPD medium). Yeast cells were grown in either raffinose (YPR medium) or glycerol (YPG medium) and then transferred to media lacking both nitrogen and glucose. Fluorescent microscopy was used to track the movement of GFP-tagged proteasomes, either a subunit of the RP (Rpn1) or the CP (α 1). This experiment determined that proteasomes localize to PSGs during nitrogen and glucose starvation regardless of the initial carbon source; however, granule formation appear to be reduced in glycerol compared to previous work.

I. Khan and D. Penning, Department of Biology, Missouri Southern State University. **SNAKES: THE DIGESTIVE OLYMPIAN.** Snakes are highly adaptable, ectothermic predators that have complex digestive systems and diverse physiological processes. While snake digestive and feeding behavior have been studied extensively, little work has been done on snake hematology; especially regarding blood glucose levels. Glucocorticoids are steroid hormones that are secreted by the adrenal gland and function to modify glucose utilization by cells. Available data on snakes show that glucocorticoids do not directly affect blood glucose concentrations. However, it is unknown how blood glucose varies by the feeding habit of the animal. Snakes are known to modify their digestive and overall metabolic processes in response to different prey sizes. By using a glucometer, I intend to quantify blood glucose in 10 *Lampropeltis getula* feeding on different prey sizes, varying by mass (5%, 10%, and 15%). Post-feed measurements, taken across a 24-hour period, will be analyzed and directly compared to pre-feed levels to monitor any elevations. These data will help inform other studies regarding snake hematology, digestive physiology, and help answer the question of how snakes appear to avoid metabolic-based diseases like diabetes. Moreover, the novel blood draw method of using a lancet to target skin capillaries provides a safe, novel, and unique method of multi-collection for blood samples. *L. getula* is known to be a high-metabolism snake. In future modeling, cross-analysis will be performed with a heavy-bodied, low-metabolism snake, *Python regius*, under identical conditions to contrast the opposite model of squamate digestive physiology.

K. Knierim, and M. Ghosh-Kumar, Department of Biology and Chemistry, Cottey College. **ANALYSIS OF MICROCYSTIN PRODUCTION OF CYANOBACTERIA WITH AN EXPOSURE OF ENVIRONMENTAL DRUG POLLUTANTS.** Environmental toxins and climate change are causing many algal species to trigger harmful algal blooms (HABs) globally. *Microcystis aeruginosa*, a widely distributed cyanobacterial species, alters its toxin (microcystin) production due to exposure of various environmental chemicals and personal care products. A higher amount of toxin could threaten public health and would cause many water-borne illnesses in the future. Our lab is undertaking a research project to quantify the microcystin production of

M. aeruginosa with an acute exposure (7 days) of several non-steroidal anti-inflammatory drugs such as ibuprofen, acetaminophen, and the antibiotic sulfamethoxazole. Our experiments observed rapid destruction of bacterial species due to the exposure of sulfamethoxazole and ibuprofen compared to Acetaminophen exposure. Interestingly, we did not find significant changes in microcystin concentration through inhibitory-competitive ELISA assay during the same drug treatment. Hence, our results on microcystin production are not directly supporting what others (Zhang et al., 2020) found through liquid chromatography. However, this research topic opens new questions in relation to the bacterial metabolic processes, oxidative stress responses, and healthy balance of aquatic ecosystem.

S. Lankford and B. Bledle, Department of Biological and Clinical Sciences, University of Central Missouri. **INVESTIGATING ECOPHYSIOLOGICAL LIMITS TO ELEVATED WATER TEMPERATURE IN LAKE STURGEON (*ACIPENSER FULVESCENS*)**. Elevated environmental temperatures have obvious impacts when they induce largescale fish kills, but the negative impacts begin on much smaller scales. These impacts are measurable and likely influence the distribution of lake sturgeon. At their southern range lake sturgeon are exposed to increasing water temperatures, as well as other habitat alterations (Moore et al. 2021). Despite this knowledge, very little is published about the physiological impact of elevated temperature in this species. The available literature investigated temperatures well below the temperatures in the southern limits of lake sturgeon range, which are reported to reach 33-35°C (Bezol et al. 2002). To address this knowledge gap, the metabolic impact of acclimation to 15°C, 20°C, and 25°C water on juvenile lake sturgeon was investigated. The oxygen consumption rate was monitored, both during rest (routine metabolic rate; RMR) and after a forced swimming activity (active metabolic rate; AMR). The metabolic scope of performance (MS) was calculated, along with key growth and nutrient indicators, to determine if acclimation temperature negatively impacts metabolic potential. Oddly, the selected temperatures did not significantly alter the RMRs of lake sturgeon, but the AMR of 25°C fish (0.245mg oxygen/hr/g) was significantly higher than the 15°C fish ($p < 0.05$). No impact was found between the MS of these lake sturgeon, suggesting minimal impact. However, other organismal level metrics like decreased percent survivability (97.78% vs 61.36%, respectively), reduced final weight, reduced condition factor, lower hepatosomatic index, and lower hepatic glycogen suggest the fish acclimated to 25°C were negatively impacted by the high temperatures.

A. Mantel¹, E. Diaz-Miranda², A. Lough³, G. Thurmon¹, ¹Department of Marine Biology, ²Department of Obstetrics, Gynecology and Women's Health, University of Missouri, ³Department of Biology, Central Methodist University. **UTILIZING KNOWN SHARK SPECIES TO TEST THE PRECISION OF ENVIRONMENTAL DNA**. Environmental DNA (eDNA) is becoming more prevalent as a monitoring method used in marine biology studies. This study was conducted to ascertain if eDNA sampling can accurately detect known shark species. Aquariums at Wonders of Wildlife were used as the control and the dive site, and Tiger Beach, Bahamas, was the study site. Jonah Ventures aquatic eDNA sampling kits and bioinformatic analysis methods were used to obtain the data analyzed. The control and study site had four (aquariums) and three (dives) biological replicates, respectively. Each had two technical replicates per biological replicate. The average percentage of visual encounter surveyed (VES) shark species identified by eDNA sampling were 68.8% in the aquariums in contrast to 19.4% at the dive site. There was a

direct relationship between the number of sequence reads and the number of individual sharks present. This was assessed by a linear regression analysis indicating a positive strong correlation (0.74; $p < 0.05$) in the aquariums whereas no correlation was found at the dive site. Among the environmental factors studied, temperature and salinity showed negative correlations ($p < 0.05$) between the percent of VES shark species identified by eDNA while dissolved oxygen and pH showed no significant correlations ($p > 0.05$). The reverse primer (Shark150R) was shown to have a consistent error that had a potential negative affect on the accuracy of the eDNA sampling. This study showed, in comparison with the aquariums, eDNA sampling could not accurately identify known shark species at Tiger Beach. This is potentially due to the quality of the primers.

A. Nkem, C. Stewart and A. Russell, Department of Biology, Missouri State University. **HOW EPIPHYTIC BACTERIAL ABUNDANCE AND ENVIRONMENTAL CONDITIONS AFFECT FLOWER LONGEVITY.** Floral longevity determines when pollinators can visit and thus plays a vital role in plant reproductive ecology. Because floral tissue is metabolically expensive, flower longevity tends to be highly influenced by environmental factors including temperature, humidity, and precipitation. Flowers are often colonized by abundant and diverse epiphytic microbial communities that may also influence metabolic costs of flower maintenance. Yet how environment and flower age interact to influence microbial abundance is unknown, despite the potential importance of these processes for understanding flower microbial community assembly and function. We investigated (1) if floral bacteria changed in abundance as flowers aged, and (2) whether shorter or longer-lived flowers accumulated bacteria more quickly, (3) and how environmental conditions shaped these patterns. We tagged flower buds of eight plant species over two years to determine flower age from anthesis to senescence. Each day after anthesis, flowers were removed and washed to examine changes in epiphytic bacterial abundance (via plating), and we collected environmental data from a nearby weather station. All species accumulated bacteria as flowers aged, but flowers that senesced quickest accumulated bacteria fastest. Furthermore, higher temperatures negatively affected both floral longevity and microbial growth. Analysis of other environmental effects are pending. Our results suggest that shorter lived flowers may tolerate more bacteria and/or longer-lived flowers may have mechanisms to reduce bacterial colonization and growth.

A. Stevens and M. Kilmer, Department of Biology and Environmental Health, Missouri Southern State University. **CHRONIC EFFECTS OF MICROPLASTICS EXPOSURE ON AN AQUATIC MICROCRUSTACEAN, *DAPHNIA MAGNA*: A DETERMINATION OF MINIMUM EFFECTIVE CONCENTRATIONS.** The use of plastics has increased steadily for decades. Plastics are environmentally persistent, especially in aquatic environments, which serve as sinks for these substances. Exposure to plastics in the environment, particularly the small particles referred to as microplastics have been show to show a variety of negative effects on aquatic organisms. This study was conducted to explore the sublethal effects of microplastics on an aquatic species, *Daphnia magna*, and to determine if a minimum effective concentration could be determined. Both acute (48-hr) and chronic (21-day) studies were utilized. While the acute tests were not successful at inducing lethality, the chronic test did reveal interesting sublethal effects. By exposing organisms ($n=10$ per treatment) to a variety of microplastics concentrations (0, 0.625, 1.25, 2.5, 5.0 and 10 mg/L), we were able to see notable effects on growth, with organisms exposed to higher concentrations of plastic (1.25 or greater) having a significantly

larger ($p < 0.0001$) carapace length (1.119 ± 0.008 mm), than controls (1.009 ± 0.014 mm) at 21 days of age. This is particularly interesting as earlier pilot studies comparing sizes of offspring produced by these adults, indicated that offspring of adults exposed to plastics are significantly smaller ($p = 0.002$) than controls. This represents a deviation from the normal ecological paradigm of larger organisms typically producing larger and/or more numerous offspring.

A. Sylla and V. Zeljkovic, Department of Chemistry and Physics, Lincoln University. **COMPUTER ASSISTED ANIMAL BEHAVIOUR AND HABITS STUDY.** There are a lot of animals on the planet, most being wild and not fully known to us. All the animal species are different in looks, habitat and behavior. They eat differently, live in different lands, reproduce in different ways and time of the year, and they all survive differently. Figuring out the behaviors of various species, their migration, movements and habitats will help us understand them better and help science students learn more about the different species of animals that are there in the wild. This is why we are deriving a simulation and a mathematical model that automatically detects and quantifies surveyed animals in the wild. We will design an algorithm and develop a new, simple, fast and effective method for moving object detection in outdoor environment, invariant to extreme illumination changes. The goal of this project is to provide an automated approach to assisting biologists and zoologists to automatically detect presence, surveillance and quantification of animals in wild. Mathematical model and simulation model in MATLAB is derived and implemented based on the inherent image features in the analyzed video sequences. This is an interdisciplinary undergraduate project which encompasses computer science, computer applications, zoology, data analysis and digital image processing and exposes a minority student in STEM, to various science fields. It is entirely realized and performed on Lincoln's campus funded by Title III FUTURES Act Strengthening STEM Major Through Provision of Supplemental Resources.

Poster Presentations:

M. Calfee¹, Z. Locke¹, A. Postlewait¹, D. Moser², S. Hamilton-Brehm³ and J. Campbell¹, ¹Department of Natural Sciences, Northwest Missouri State University, ²Division of Earth and Ecosystems Sciences, Desert Research Institute, ³Department of Microbiology, Southern Illinois University. **CULTIVATION AND CHARACTERIZATION OF *HALALKALIBACTERIUM* sp. ZL23 FROM SUBSURFACE WATER IN THE NEVADA DESERT.** The deep subsurface is considered one of the major unexplored habitats for prokaryotes. Several deep, subsurface-water samples from the Pahute Mesa-Oasis Valley area, near the Nevada National Security Site, were used for enrichments using a selection of synthetic media that attempted to simulate the natural conditions of the groundwater. Sanger sequencing of the 16S rRNA gene of Isolate ZL23 showed 100% identity to *Halalkalibacterium halodurans*, a bacterium isolated from an alkaline, soda lake in India. Medium optimization and biochemical profiles of this isolate are being developed.

L. Carter, R. Mailey, J. Zhu, O. Buschhaus, J. McGhee, A. Campbell and J. Campbell, Department of Natural Sciences, Northwest Missouri State University. **MITOCHONDRIAL DNA VARIATION AND CHYTRID MONITORING OF BULLFROG (*LITHOBATES CATESBEIANA*) POPULATIONS IN NODAWAY COUNTY, MO.** Bullfrogs (*Lithobates catesbeiana*) are an important frog species native to Missouri. However, information relative to gene flow patterns is limited for these frogs in the Northwest Missouri region. Moreover, bullfrogs can act as a reservoir to pathogenic chytrid fungi (*Batrachochytrium dendrobatidis* and *B. salimandrivorans*) that cause cutaneous infections and significant population decline in amphibian communities. Therefore, we are optimizing quantitative PCR assays published for their detection in swab samples. We have determined that bead milling of swabs in PrepMan™ reagent for 3 minutes provides optimal detection of spike-in controls. Based upon deposited mitogenomes from other countries, we designed an array of PCR primers with the goal of amplifying the mitochondrial genome in large segments, followed by long-read-sequencing (Oxford Nanopore). Approximately 50% of the mitogenome of several individuals has been obtained using this approach, and closing these genomes using a similar approach is underway.

D. Christopher, C. Punzo, J. Baker and C. Ganong, Department of Biology, Missouri Western State University. **EXPLORING PREVALENCE OF DEER BRAINWORM (*PARELAPHOSTRONGYLUS TENUIS*) IN SNAIL INTERMEDIATE HOSTS USING A NOVEL MOLECULAR TECHNIQUE.** *Parelaphostrongylus tenuis* (*P. tenuis*) is an extrapulmonary lungworm that infects ruminants and requires a gastropod intermediate host. Symptoms are minor in white-tailed deer, but infection can be fatal in elk and other cervids. Assessing the prevalence of *P. tenuis* is therefore useful in gauging risks associated with elk reintroduction to Missouri. While previous methods for detection of *P. tenuis* in gastropods are labor-intensive, time-consuming, and only detect final-instar larvae, this novel method uses polymerase chain reaction (PCR) technology to detect *P. tenuis* at any larval stage in a gastropod intermediate host in 3-4 hours. Approximately 200 snails (*Neohelix alleni*, a known *P. tenuis* host) were collected May-July 2023 at Loess Bluffs National Wildlife Refuge, a location where *P. tenuis* is known to infect white-tailed deer. Of the 76 snails processed to date, one was infected with *P. tenuis*. While a majority of the snail samples have yet to be processed, this finding (1.3% infection rate) is consistent with low gastropod infection rates (0-8.9%) reported in previous literature. We anticipate that this method could be used to test other types of samples (e.g., feces) from cervid hosts.

T. Eckdahl, M. Mills, and M. Grantham, Department of Biology, Missouri Western State University. **ESTABLISHING AND MAINTAINING APPLIED LEARNING PROGRAMS DURING ADMINISTRATIVE CHANGES.** The Missouri Western State University Biology Department has a longstanding tradition of supporting student applied learning. With a dedicated faculty of teacher/scholars, our department prides itself on a culture that provides classroom-based and independent research experiences for its undergraduate students. During the past 20 years, we have invented a variety of programs and practices, but the establishment and maintenance of them have been challenged by shifting administrative personnel, unpredictability of the availability of funds, and changes in the overall institutional environment. Examples that have survived these challenges include the use of department funds for the purchase of equipment and supplies for both teaching and research, a Multidisciplinary Research Day poster presentation

event on campus, and the availability of support for students to present research at national meetings. Programs and practices that have been diminished from challenges include the summer Program of Research, Teaching, and Applied Learning (PORTAL), the academic year Gold Fridays PORTAL, and the use of departmental funds for faculty travel.

S. Elder, A. Bogdon and M. Grantham, Department of Biology, Missouri Western State University. **USE OF NANOPORE SEQUENCING TO CHARACTERIZE FRESHWATER VIROMES IN URBAN PONDS.** The advent of relatively low cost sequencing platforms and tools has provided an avenue for metagenomics to the undergraduate research lab. One area in which considerable knowledge gaps exist is in viral metagenomics of environmental samples. The viruses that can be found in freshwater environments is one such area. Nanopore sequencing is relatively affordable and accessible way to begin to address this knowledge gap. We tested the use of Flongle flowcells to sequence DNA that was purified from four of the nine ponds on the MWSU campus. We found that the amount of sequence data obtained from each run varied greatly, but correlated with the purity of the DNA extracted from the sample. For each run, around half of the sequences were unable to be identified, and the most common virus found in each sample was *Muvirus*. This appears to be an unusual situation, and it is not yet clear whether this is a real result or if this is due to software errors in assigning sequence identities. In addition, we found a large amount of contaminating sequence from cellular organisms, particularly bacteria and cyanobacteria. This limited the usefulness of this technology to identifying the most common viral sequences in these samples rather than characterizing the viromes. However, these preliminary data suggest that nanopore sequencing could be a viable option that is accessible to undergraduate research laboratories.

E. Goodwyn, S. Antonopoulos and P. Durham, Department of Biology/Jordan Valley Innovation Center, Missouri State University. **IDENTIFICATION OF SPRING SEASON FRESHWATER BIOFOULING ORGANISMS ON FLEXIBLE SENSOR SUBSTRATES.** There is an increasing demand for development of sensors that continuously monitor freshwater safety and quality. Developing sensors with flexible substrates is of interest due to their malleability, cost effectiveness, and durability. The accuracy and performance of sensors submerged in water for extended times can be greatly reduced by biofouling. The goal of this study was to identify via next generation sequencing (NGS) the 16S and 18S rRNA gene sequences of prokaryotic and eukaryotic microorganisms that adhered to submerged flexible substrates. The substrates cyclic olefin copolymer (COC) and polyethylene terephthalate (PET) were suspended in aquaria filled with river or pond water from the Springfield, MO, region collected during April and maintained at 60°F to simulate spring conditions. Isolated DNA was used for NGS analysis to identify adherent microorganisms and determine relative abundance. The most prevalent biofouling organisms were bacteria in river water and pond water on both substrates. *Betaproteobacteria* were the most abundant bacteria on all substrates and water sources. This class of bacteria are known to be gram-negative eutrophs, requiring a relatively large amount of organic nutrients. The species *Roseateles aquatilis* and *Pelomonas saccharophila* were most abundant on COC in river water, while the species *Aquincola tertiaricarbonis* and *Zooglea ramigera* were most abundant on COC and PET in pond water. Within higher taxonomic levels, there were negligible differences between the biofouling abundances on river and pond conditions and substrates COC and PET.

A. Justus, N. Burroughs, R. Frye, J. Kuy, C. Menne, J. Schneider, L. Tinoco, S. Weber and C. Barta, Department of Biology, Missouri Western State University. **A THREE-YEAR SURVEY OF THE RELATIONSHIP BETWEEN NATIVE AND INVASIVE PLANT SPECIES' SUCCESS ON THE JOHN RUSHIN TEACHING AND RESEARCH PRAIRIE AT MISSOURI WESTERN STATE UNIVERSITY.** Prairies historically covered over 400,000 square miles of North America. However, as a consequence of land use change and agricultural repurposing, prairie coverage declined to less than 5% of historical values. In recent years, the scientific efforts focused on prairie restoration have largely increased, also establishing the basis of science-informed management practices. As part of such a restoration effort, Missouri Western State University restored a 26-acre campus plot to a conservation prairie in 2018. The current work focused on an initial, two-year survey of the relationship between emerging native and invasive species after the initial seeding in 2020, and re-assessed after prairie management by controlled burning in 2023. Based on our initial survey, we found that in its first two years after seeding, only a proportion of the seeded prairie vegetation emerged successfully, while invasives and noxious weeds were still represented by many species in distinct areas of the prairie. About 40% of species captured by our survey was native to Missouri, dominated by species in the daisy family and grasses. Post-burn, the proportion of native species increased to 55% in the vegetation composition, but still, community composition was dominated by the daisy family and grasses. Further prairie management and successful competition between prairie species and invasives is expected to alter species composition in the following years, potentially shifting towards a higher success of native prairie species vs. invasives. Planned differential management practices are expected to reveal best-fit management approaches to ensure native success and conservation, in the following years.

T. Larison, N. Burroughs, R. Frye, A. Justus, S. Weber and C. Barta, Department of Biology, Missouri Western State University. **PRAIRIE SPECIES' VULNERABILITY TO BIOLOGICAL INVASIONS: VELVET BEAN (*MUCUNA PRURIENS*) SUPPRESSES BIG BLUESTEM (*ANDROPOGON GERARDII*) GROWTH AND DEVELOPMENT.** As consequence of land use change, agricultural repurposing, overgrazing, and biological invasions, the historical North American prairie ecosystem coverage has substantially declined in the past decades. Big bluestem (*Andropogon gerardii*) is a native grass dominating tallgrass prairies of Central-North America. Our work focused on understanding the vulnerability of this native species to invasions and native-invasive species competition. In a greenhouse experiment, we found that big bluestem emergence, growth, and biomass decreased when co-planted with velvet bean (*Mucuna pruriens*), a semi-invasive species. We found velvet bean planted alone to emerge over a week earlier, compared to beans co-planted with big bluestem, indicating a mutually suppressive effect of the two species in their initial developmental stage. Nevertheless, after 12 weeks, no differences were detected in the velvet bean's development, height, and overall biomass when planted alone or in combination. On the other hand, big bluestem biomass decreased by 70%, while the shoot/root biomass ratio favored a higher shoot mass versus roots in the plants exposed to the competitive pressure, indicating repression of root growth in these plants 12 weeks after emergence. Leaves of big bluestem growing alone showed a nearly two-fold higher total chlorophyll ($304 \pm 23 \mu\text{g m}^{-2}$) than the competing grass ($166 \pm 14 \mu\text{g m}^{-2}$) 12 weeks after emergence, indicating that the competing grass was experiencing "stress-like" conditions. We attribute this effect to a potential belowground chemical interaction between the two competing species. The exact nature of these, potentially chemical interactions will be further investigated in the future.

J. Lessenger, K. Krueger, M. Adams, M. Flachs, A. Benedict and S. Reardon, Department of Biology, Culver-Stockton College. **ISOLATION, PURIFICATION, AND ANNOTATION OF NOVEL MYCOBACTERIUM PHAGE JDog.** The novel bacteriophage JDog was discovered in 2023 by students in the Genomics Research course at Culver-Stockton College. JDog was collected from soil in Fruitland, Iowa, before being isolated, purified, and amplified using the host *Mycobacterium smegmatis* Mc²155. JDog is a lytic *Siphoviridae* with an average length of 347.25 nm that produces clear plaques roughly 4 mm in diameter. The genome of JDog is 68,613 base pairs with a GC content of 66.4% and, based on sequence similarity, is assigned to cluster B, subcluster B1. Auto-annotation of JDog's genome in DNA Master using Glimmer and Genemark predicted 100 protein-coding genes, each of which was then manually curated to assign a putative function. Additional annotation programs that were used include Phamerator, Starterator, PhagesDB, HHpred, DNA Master, PhageDB, NCBI, TMHMM, Aragorn, tRNA-SE, as well as the SEAPhages Bioinformatics Guide. The assigned functions resembled those predicted in closely related phages and included a portal, terminase, capsid maturation, scaffolding, major capsid, lysin A, holin, major tail, minor tail, and tape measure protein, among others. No tRNAs or tmRNAs were identified and it was confirmed that our phage, along with other B cluster phages, lack a tail-assembly chaperone. Bacteriophages are ubiquitous in nature and have been an invaluable resource in research settings. The ongoing discovery and characterization of new phages continues to expand our understanding of their diversity. Additionally, because interactions between phages and their hosts are so specific, there is promising potential for their utilization as therapeutic agents.

E. Loder, S. Antonopoulos and P. Durham, Department of Biology/Jordan Valley Innovation Center, Missouri State University. **IDENTIFICATION OF WINTER FRESHWATER BIOFOULING ORGANISMS ON FLEXIBLE SENSOR SUBSTRATES.** There is an increasing demand for development of sensors that continuously monitor freshwater safety and quality. Developing sensors with flexible substrates is of interest due to their malleability, cost-effectiveness, and durability. The accuracy and performance of sensors submerged in water for long times can be greatly reduced by biofouling. The goal of this study was to identify via next generation sequencing (NGS) the 16S and 18S rRNA gene sequences of prokaryotic and eukaryotic microorganisms that adhered to submerged flexible substrates in freshwater samples obtained in January 2023. Substrates cyclic olefin copolymer (COC) and polyethylene terephthalate (PET) were suspended in aquariums filled with river or pond water from the Springfield, MO, region and maintained at 40-45°F to simulate winter conditions. No major differences in biofouling abundances between river and pond conditions nor COC and PET substrates were detected. The most prevalent taxonomic groups were the *Bacteria* followed by *Fungi* and *Archaea*. At the phylum level, *Ascomycota* and *Proteobacteria* were most abundant, followed by *Firmicutes*. *Neosartorya fischeri*, a teleomorph (sexual reproductive stage) of *Aspergillus* was the most prevalent species. *Halarchaeum solikamskense*, a halophilic archaeon, was the second most abundant species, followed by the bacterium *Corynebacterium kroppenstedtii*. Future studies will be initiated to identify antifouling strategies that limit bacterial, fungal, and archaeal growth on flexible sensor substrates submerged in winter water.

E. Loder, S. Antonopoulos and P. Durham, Department of Biology/Jordan Valley Innovation Center, Missouri State University. **ORAL PFOS EXPOSURE IS ASSOCIATED WITH GREATER DYSBIOSIS IN ADULT MALE SPRAGUE-DAWLEY RATS COMPARED TO CHANGES IN FEMALES.** Perfluorooctanesulfonic acid (PFOS) has been phased out of production in the United States, but because of its resistance to degradation and its persistence in

the environment, PFOS can be found in drinking water across America. Oral exposure to PFOS has been linked to adverse developmental, immunological, hepatic, and endocrine health. Oral PFOS exposure may alter the gut microbiota and cause dysbiosis, which is implicated in the pathology of inflammatory diseases like Crohn's disease, diabetes, and ulcerative colitis. The goal of the study was to investigate the effects of PFOS exposure on the composition of the gut microbiota. Adult male and female Sprague-Dawley rats were exposed to PFOS via drinking water at a concentration of 0.5 µg/mL, 5 µg/mL, or only water (control) for the duration of the 28-day study. Fecal samples were collected on days 0, 14, and 28 before the DNA was isolated, pooled, and next generation sequencing of 16S rRNA genes was performed. A significant decrease in weight was observed in PFOS exposed males at week 1 (5 µg/mL, $p<0.001$) and 2 (0.5 µg/mL, $p<0.01$), and in females at week 3 (5 µg/mL, $p<0.05$). The *Firmicutes* to *Bacteroides* (F/B) ratio, an indicator of dysbiosis, decreased in PFOS exposed males and increased in females at 0.5 µg/mL. The F/B ratio remained consistent in females exposed to 5 µg/mL PFOS. The class *Bacteroidia* increased in PFOS-exposed males and decreased in PFOS-exposed females, whereas class *Clostridia* decreased in males and increased in females. These findings suggest that oral exposure to PFOS causes mild dysbiosis, particularly in males, and hence, male PFOS exposure over time may increase the risk of diseases of the digestive system. Females may have a protective mechanism against PFOS-induced dysbiosis.

C. Punzo, V. Cline, C. Taylor, A. Danner and K. Walton, Department of Biology, Missouri Western State University. **THE EFFECTS OF PREBIOTICS ON THE SUSCEPTIBILITY TO DEXTRAN SODIUM SULFATE-INDUCED COLITIS IN MICE.** Inflammatory bowel disease (IBD) encompasses two chronic inflammatory diseases of the colon. We induced colitis in eight mice with 8 days of oral administration of 3.5% dextran sodium sulfate (DSS), a widely used animal model of IBD. Seven days before the DSS treatments, four out of the eight mice were treated with fructooligosaccharide (FOS), a prebiotic fiber molecule, in the drinking water to observe whether this altered their susceptibility to subsequent DSS colitis induction. At the end of DSS treatment, colon tissue was collected for RNA analysis and histology, and fecal samples were saved for fecal DNA analysis. Preliminary results from RT-PCR and quantitative PCR for pro-inflammatory cytokines and tight junction proteins indicated that there was no difference between the FOS-treated group and the DSS only group. Fecal DNA RT-PCR analysis revealed no difference in *Lactobacillus* species between experimental groups. These findings suggest that FOS may not be beneficial to reduce inflammation in IBD patients.

R. Punzo and T. Roy, Department of Biology, Missouri Western State University. **OUR ONGOING WORK ON THE DOCUMENTATION AND ORGANIZATION OF THE LEO A. GALLOWAY HERBARIUM.** Missouri Western State University received a gift of 251 specimens from the Ray J. Davis herbarium in Idaho, and we have been working towards updating the taxonomy of the finished mounts. Herbarium specimens are especially important for plant taxonomy and documenting changes in the range extent of rare or important species and their ecosystems through time. The vascular plants within our collection are angiosperms and gymnosperms with a few species of the sister group *Magnoliids* which stemmed before dicots and eudicots. The different classifications of plants will be used to incorporate the updated plant specimens into our collection by separating them based on their clade and then further alphabetically by family. Once all specimens are updated and added to our collection of ~3000, our collection will be uploaded to the New York Botanical Gardens Index Herbarium.

M. Reese, D. di Donto, M. Brown, M. Misner, C. Selk, A. Smallwood and L. Prowant, Department of Biology, Culver-Stockton College. **NATIVE GRASSLAND PROJECT AT CULVER-STOCKTON COLLEGE.** This project aims to establish a native grassland on campus to increase native insect populations in the area. There is a high correlation between native grassland and insect diversity (Spafford & Lortie, 2013). We propose constructing a native grassland on Culver-Stockton's campus that will be approximately 0.2-0.5 acres. We determined a mix of native grasses and forbs would produce a suitable habitat for native insects. Students will use research techniques to obtain soil samples and determine the necessary nutrients for plant growth. Using these data, students will plant and sustain a native ecosystem and teach future students how to do the same. This native grassland on campus would bring opportunities for students' experiential learning and allow for the biology department to expand its range of coursework and research. This project would cater to the students, current and future, who want to pursue careers in ecology, conservation, and or wildlife biology.

M. Shields¹ and L. Hancock², ¹Division of Science, Math, and Computer Science, Central Methodist University, ²Department of Molecular Biosciences, University of Kansas. **THE *ENTEROCOCCUS FAECALIS* TWO-COMPONENT RESPONSE REGULATOR *EtaR* CONTRIBUTES TO SALT TOLERANCE.** *E. faecalis* is known to resist a variety of environmental stresses including salts and antibiotics. Bacteria, including enterococci, often rely on two-component signal transductions systems (TCS), comprised of a sensor histidine kinase coupled to a response regulator, to sense and respond to such environmental stresses. In *E. faecalis*, there are 18 TCS, and for many of these systems, it is not certain what they sense and the transcriptional changes that take place in order to mediate a response. A previous publication that focused on a subset of the TCS that are members of the OmpR/PhoB superfamily identified one such TCS that contributed to pathogenesis as a mutant of *etaR* which displayed delayed killing and higher LD₅₀ in a mouse peritonitis model. To gain a better understanding of what the *EtaRS* TCS senses and responds to, we created a markerless deletion of *etaR* and tested the resulting mutant against a variety of extracellular stresses. Here we show that exposure to high salt concentrations (8% NaCl) resulted in decreased growth for the *etaR* mutant, relative to a genetic revertant and the parental strain (V583).

D. Silva Torres, S. Antonopoulos and P. Durham, Department of Biology/Jordan Valley Innovation Center, Missouri State University. **METHOD FOR CRYOPRESERVATION OF SPINAL CORD TISSUE FROM SPRAGUE-DAWLEY RATS FOR ESTABLISHING PRIMARY CULTURES OF NEURONS AND GLIA.** Primary cultures are used to elucidate cellular and molecular mechanisms involved in disease pathology and modulation by pharmaceuticals and nutraceuticals, and to identify novel therapeutic targets. However, preparation of primary cultures from rodent embryos is labor-intensive, and it can be difficult to produce high-quality consistent cultures. To overcome these issues, cryopreservation can be used to obtain standardized, high-quality stocks of neuronal cultures. In this study, we present a simplified cryopreservation method for establishing primary cultures of upper spinal cord neurons and glia from Sprague-Dawley neonates, using a 90:10 (v/v) fetal bovine serum/dimethyl sulfoxide cell freezing medium. The Live/Dead Cell Imaging assay was used to determine cell viability of the cultures

and immunocytochemistry was used to characterize basal expression of proteins. Cryopreserved spinal cord cells stored for up to one year in liquid nitrogen retained high cell viability and exhibited similar neuronal (NeuN and β -tubulin) and glial cell (vimentin) morphology to fresh cultures. Neuronal and glial proteins implicated in inflammation and pain signaling (CGRP, GFAP, Iba1, GAD 65/67, GABA receptors) were expressed in cell types in agreement with published studies. This method is simple, does not require special reagents or equipment, will save time and money, increase flexibility in study design, and produce consistent cultures. Furthermore, these cultures can be used to study cellular changes in response to inflammatory and anti-inflammatory agents.

S. Weber, N. Burroughs, R. Frye, A. Justus, C. Menne, J. Schneider and C. Barta, Department of Biology, Missouri Western State University. **VELVET BEAN SOIL INCLUSIONS ENHANCE THE GROWTH, BIOMASS AND PHOTOSYNTHETIC ASSIMILATION EFFICIENCY IN TOMATO.** Invasive species often employ competitive strategies as the release of allelopathic metabolites into the environment, which negatively impact native species. Velvet bean (*Mucuna pruriens*, VB) has been reported to produce a variety of such, toxic compounds, as L-dopa, tryptamines, phenols, and tannins, with notable allelopathic activities, suppressing the growth and development of competing native species, but without any autotoxic effects. Our current study focused on the chemical impact of degrading VB seeds on tomato seedlings. We found that VB seed inclusions significantly altered tomato growth, biomass, chlorophyll concentrations, light harvesting and processing ability and photosynthetic efficiency. VB seed coat inclusions inhibited growth and leaf development, and leaves contained 30% less chlorophyll than controls. VB seed coat soil inclusions also induced an over 50% reduction of maximum and effective quantum yields and defects in photosynthetic energy processing, with a corresponding shift in energy processing away from photochemistry, towards non-photochemical quenching. VB endosperm, however, stimulated tomato growth and leaf expansion, resulting in doubled biomass, compared to controls. Plants growing in soil enriched with VB endosperm inclusions exhibited higher total chlorophyll concentrations and more efficient light harvesting and photochemical energy processing capacity when compared to controls, indicators for enhanced photosynthetic capacity in these plants.

Chemistry Section

Oral Presentations:

P. Clubb^a, J. Linson^a, M. Reyes^a, E. Horn^b, and C. Rico^a, ^aDepartment of Chemistry and Biochemistry, Missouri State University, ^bWillard High School. **INVISIBLE EFFECTS OF PARENTAL EXPOSURE TO CERIUM OXIDE NANOPARTICLES ON RESPONSES OF PROGENY PLANTS EXPOSED TO PERFLUOROOCETANESULFONIC ACID.** The effects of parental stress on the performance of next generation exposed to another contaminant were investigated. Wheat was exposed to cerium oxide nanoparticles (CeO₂-NPs) in first and second generations and exposed to perfluorooctanesulfonic acid (PFOS) in the third generation. Phenotypic or metabolic responses were assessed at 21-day (short-term exposure) or 90-day (long-term exposure) exposure periods. Biomass production, chlorophyll content, enzyme activity, and membrane damage were measured at short-term exposure, while elemental and PFOS concentrations, and grain metabolites were analyzed in long-term exposure. Results showed that previous exposure to CeO₂-NPs improved chlorophyll content but reduced concentrations of important macro- and micro-elements in the grains, shoots and roots of daughter plants exposed to PFOS. PFOS concentrations showed no effects from prior exposure from CeO₂-NPs while metabolomic analysis revealed that parental exposure had significant influence on the metabolite composition of daughter plants. For example, consistent and repeated previous exposures to CeO₂-NPs had progressively decreased the abundances of sucrose-6-phosphate, adenine, and other organic acid metabolites. The findings suggest that stress memory from prior generation's exposure may be transmitted to succeeding progeny generations via invisible changes in metabolite and elemental compositions of grains.

G. August, L. Spence, A. Wisener, L. Gilbert-Saunders, Department of Chemical and Physical Sciences. Missouri Southern State University. **METHOD VALIDATION FOR THE SEPARATION OF STEROIDAL COMPOUNDS FOUND IN HERICIUM ERINACEUS USING REVERSE-PHASE HIGH PERFORMANCE LIQUID CHROMATOGRAPHY.** With the growing demand for *Herichium erinaceus*, commonly known as Lion's mane, both for medical research and for consumer use, there is a considerable need for the ability of manufacturers to quantify the potentially beneficial compounds produced by the fungus. The ability to quantify beneficial compounds in specific phenotypes would allow for selective breeding of strains that produce molecules of interest in higher quantities. Three steroidal molecules of interest, betulin, ergosterol, and ursolic acid, were chosen for investigation using High Performance Liquid Chromatography, Shimadzu Prominence-i, equipped with a C8 column and a tri-component polar mobile phase. Retention times of 4.8 min, 20.8 min, and 4.3 min were determined respectively, and calibration curves were created for the steroidal molecules. After a variety of extraction methods were conducted, samples of both research-grown and commercial products were examined for the presence of the molecules of interest along with quantification. While preliminary testing shows that samples grown for research purposes appear to contain measurable quantities of the compounds of interest, the commercial samples tested exhibited wide variabilities in their chemical profiles.

C.M. Rico, P. Clubb, I. Shakoor, O. Ogundele, N.J. Kirwa, and J. Garland, Department of Chemistry and Biochemistry, Missouri State University. **TRANSGENERATIONAL EXPOSURES OF PLANTS TO EMERGING CONTAMINANTS.** Transgenerational changes in plants (barley, wheat) following exposures to cerium oxide nanoparticles and perfluorooctanesulfonic acid were investigated. Plant biometrics and grain metabolomics were measured at second or third generation exposures. Results showed varying degrees of influence of parental exposures on the elemental and metabolomic profile of daughter plants. This study could provide better understanding of plant responses and metabolic adjustments to continuous exposures to various contaminants present in the environment.

A. Wisener, M. Dezote, G. August, L. Spence, J. McMaster, L. Gilbert-Saunders. Department of Chemical and Physical Sciences, Missouri Southern State University. **METAL ANALYSIS OF HERICIUM ERINACEUS BY ATOMIC EMISSION SPECTROSCOPY.** *Hericium erinaceus*, or lion's mane mushroom, has been shown to increase the rate of neurite outgrowth in lab-grown nerve cells and can pass the blood brain barrier due to the steroidal nature of compounds present in their extracts. Therefore, lion's mane is highly marketed for increased brain function in the current health food climate. Due to the non-regulated nature of supplements by the Federal Drug Administration (FDA), a concern by consumers is the possibility of absorbed metals from soils. Six metals commonly found in contaminated soil and water were chosen. Using a Microwave Plasma Atomic Emission Spectra (MP-AES, Agilent Technologies) standard calibration plots at unique emission wavelength for magnesium (Mg), manganese (Mn), copper (Cu), iron (Fe), nickel (Ni), and chromium (Cr) were created in a range of approximately 0.01 to 100 parts per million metal. Next, 100mg research-grown mushrooms were digested in 5mL nitric acid and sonicated for 2 hours at 47°C. The digested solid samples were diluted to a total volume of 100mL and analyzed for metal content. Five commercial products, in both solid and liquid form were prepared based on active ingredients reported by the manufacturer in a similar manner for analysis. Of the metals examined, Fe, Ni and Mg were found to be higher in concentration when comparing liquid commercial samples versus powdered states. Additionally, Cu, Cr and Mn produced both measurable data and values below detection limits. Possible interferences by untested metals may have led to falsely increased results in Cu for research-grown mushrooms.

L. Spence, J. McMaster, G. August, A. Wisener, L. Gilbert-Saunders. Department of Chemical and Physical Sciences, Missouri Southern State University. **EXTRACTION METHODS OF HERICIUM ERINACEUS FOR STEROIDAL AND METAL ANALYSIS.** *Hericium erinaceus* (lion's mane) has increased in popularity with claims it contains compounds to improve brain activity and heart health. To test these claims, proper extraction of steroidal compounds, betulin and ertosterol, is required for research-grown or commercial products and was tested with environmental impact in mind. In addition, digestion methods for metal testing were performed. For the extraction, 50 grams of chopped mushroom, wet or dried, were soaked in a 1:4 ethanol-water solution kept at 40°C for 24 hours and then placed in a sonicating bath for 2 hours. The extraction procedure was repeated using pure methanol and dried mushroom. Following filtration, the samples were Rotavaped with the residue redissolved in methanol. Particulate filtering was used in preparation for analysis via reversed-phase high performance liquid chromatography, HPLC (Shimadzu Prominence-i). The extracts from research-grown mushrooms and commercial products were examined and retention times determined for betulin (4.8 minutes) and

ergosterol (20.8 minutes) respectively. The methanol extraction displayed a significantly higher concentration of ergosterol in solution. Data suggests dry sample extractions produced a higher concentration of ergosterol solution than wet samples. For metal determination, the digestion method utilized 100 mg of dried mushroom with varying concentrations of nitric acid, some in conjunction with 3% hydrogen peroxide. The trial solutions (A-G) were sonicated for 1 hour. The results showed a minimum of 5-7 ml of concentrated nitric acid solutions were required for complete dissolution of the dried mushroom. The digested samples will be analyzed by emission spectroscopy for possible metal contaminants.

S. Muller, and B. Dhital, Department of Chemistry, Westminster College. **PROBING PHOTO-PHYSICAL PROPERTIES OF PORPHYRINS ON GRAPHENE OXIDE.** Porphyrins are highly tunable molecules that can be used to exert significant physicochemical properties. Graphene oxide (GO) is a two-dimensional material that is known for its photoelectrical properties. Porphyrin-graphene oxide conjugates have been studied because of the potential uses in electronic applications such as solar technology and organic electronics. A detailed study of the photoinduced charge-transfer processes on these hybrids is critical to understand the coupling of molecule-material interfaces. In this study, we investigate the photophysical properties of porphyrin-GO nanohybrids using a combination of spectroscopic techniques providing valuable insights into the design and optimization of nanohybrids.

K. Lai, R. Herndon, K. Woelk, Department of Chemistry, Missouri University of Science and Technology. **REDUCING EXPERIMENTAL TIME FOR NMR ASPHALT PERFORMANCE ANALYSIS.** Nuclear Magnetic Resonance (NMR) Relaxometry is a powerful technique to quantify changes in the physical structure of materials by measuring the relaxation times of nuclear spins. We present a novel application in the field of civil engineering by determining the effects of aging in asphalt pavements using NMR Relaxometry. As asphalt ages, its molecular structure undergoes significant changes, which can be detected as variations in NMR relaxation times. Fresh asphalt typically exhibits a single T1 relaxation time value due to its uniform composition. With aging, chemical changes increase the complexity of the asphalt structure, leading to the emergence of one or more additional T1 values. Further aging, especially in the presence of UV radiation and oxygen, introduces even greater heterogeneity, manifesting as three distinct T1 values. This progression provides a unique signature that can be correlated with a degradation of asphalt performance. Traditionally, obtaining a reliable dataset for multiple T1 relaxation analysis requires the collection of at least 256 NMR spectra as a function of a variable relaxation delay. This data collection prevents rapid on-site analysis of road pavements. We present several methods to reduce the experimental time without compromising the accuracy of the performance estimation.

Poster Presentations:

S. Ingoli and M. Singh, Department of Science, Technology and Mathematics, Lincoln University of Missouri. **LATE-STAGE DIVERSIFICATION OF BIOACTIVE MOLECULES USING A SIMPLE HYDRAZINE REAGENTS.** Late-stage diversification involves modifying, introducing, or transforming a functional group in the final synthetic step to efficiently produce various analogs for studying structure-function relationships. This technique holds significant importance, particularly in the fields of drug discovery and chemical biology. We have

developed a simple method for diversifying and modifying carbonyl and hydroxyl groups using commercially available hydrazine reagents. Our methodology has consistently yielded desired products ranging from good to excellent yields. The reaction conditions have been optimized using simple alcohol, 4-phenyl-1-butanol, and a carbonyl compound, benzylacetone. Subsequently, we applied this method to synthesize analogs of two important medications: atenolol, a beta blocker primarily used to treat high blood pressure and heart-related chest pain, and azidothymidine (AZT), which is used in the prevention and treatment of HIV/AIDS. Supported by NSF award# 2200600.

M. Fakunle, R. Pope, C. Rico, Department of Chemistry, Missouri State University. **PERFORMANCE OF PISUM SATIVUM (PEA) ON MARTIAN SIMULANT SOIL.** This study was performed to determine the capability of Martian soil to support growth and productivity of peas. The peas were grown for full maturity on earth soil and 50:50 mix of mars simulant and earth soil. The earth soil used was rhizobium-inoculated to provide nitrogen fixing bacteria to the soil. Several parameters such as the changes in plant height, biomass, and elemental composition were measured to determine plants' performance on both soils.

I. Shakoor, R. Biagioni, F. Wang, C. Rico, Chemistry and Biochemistry Department, Missouri State University. **ADSORPTION CAPACITY OF PERFLUOROOCCTANESULFONIC ACID WITH CERIUM OXIDE AND MAGNESIUM OXIDE NANOPARTICLES.** The contamination of Perfluorooctanesulfonate (PFOS, $C_8F_{17}SO_3^-$) in water is considered a threat to humans and the environment. In this research, the removal of PFOS through cerium oxide and magnesium oxide nanoparticles was investigated. The experiment was performed by mixing PFOS with nanoparticles. The prepared suspensions were put on a shaker for 24 hours for mixing. The samples were allowed to settle down for half an hour before centrifugation. The filtrate was analyzed through Liquid Chromatography Mass spectrometry, and the solid samples (after washing with water) were analyzed through X-ray Diffraction (XRD). The results showed that the nanoparticles could adsorb PFOS. XRD data did not show any changes in the cerium oxide nanoparticles structure, but a minor change was observed in the structure of magnesium oxide nanoparticles.

K. Frey, Department of Art and Design, Missouri State University. **REMEDICATION OF CORROSION ON EXCAVATED IRON OBJECTS.** In this Museum Studies conservation course project, I researched and identified a group of iron farm implements excavated from the Bonniebrook estate, the early 20th-century home of Rose O'Neill. Widely known for having created the Kewpie doll, O'Neill was also a prominent artist, illustrator, author, and suffragette. Bonniebrook was the O'Neill family farmstead from 1891 through 1944, and iron farming equipment excavated from the estate were common objects of the early 20th century. For my conservation project, I identified several objects, which included a ditching shovel blade, a logging chain, and a post-hole digger. While the iron medium made these tools strong and durable, they were also prone to corrosion. The first step in preserving these objects was to clean them and evaluate the level of corrosion, in order to determine the best methods for remediation. The best method for preserving the logging chain, which had surface rust, was determined to be electrolytic rust removal; after I used this method to effectively remove the corrosion, I applied a microcrystalline wax sealant. The best method for preserving the ditching shovel blade and the post-hole digger, which were rusted throughout, was determined to be a tannic acid rust converter. After applying the rust converter and converting the corrosion into ferric tannate, I coated the shovel and digger with a black oil-based paint, which sealed and protected these artifacts.

E. Elliot-Lee, Department of Art and Design, Missouri State University. **MATERIALS AND PROCESSES FOR RESTORATION OF BADLY DAMAGED OIL-ON-CANVAS PAINTINGS.** In this Museum Studies internship conservation project, I researched a series of seven oil-on-canvas paintings by Howard Garrison from the collections of the Christian County Museum. Garrison was a businessman and a colorful character from Ozarks history whose real passion in life was painting. Using his restaurant, the Riverside Inn, as his gallery, he expressed his self-taught impressionistic style in landscapes and still lifes. For this internship project, I conserved and restored three badly flood-damaged paintings from this series of seven paintings. First, I repaired the rips in the paintings. Next, I cleaned the dirt and grime from the paintings, and then I removed badly yellowed, flaking varnish using different concentrations of an acetone and distilled water solution. I filled in all areas of pigment loss with gesso and filled in uneven areas with a paste of gesso and ground chalk, and then I consolidated and preserved each canvas with a 10% solution of B72 Acryloid and acetone. Finally, after in-depth research of Garrison's work, I restored the paintings by inpainting the missing areas of pigment to blend harmoniously with the original work.

Computer Science & Math Section

Oral Presentations:

Jeremy Smith, Guy Colado, Sunvy Tong, Tomas Jagar, Sylvester Orimaye, College of Global Population Health, University of Health Sciences and Pharmacy in St. Louis. **DETECTING DEPRESSION FROM EEG DATA USING ARTIFICIAL INTELLIGENCE TECHNIQUES.** Depression is a complex and multifaceted condition that often manifests with hard to notice signs. Traditional screening methods may not capture the full spectrum of symptoms, causing delayed diagnoses or misdiagnoses. Our goal is to show that depression diagnoses can be aided by machine learning models specifically designed for the problem. Since depression is associated with changes in prefrontal brain activity, we use Electroencephalogram (EEG) signals from this region of the brain as our primary input data. The EEG channels used are the Fp1, Fp2, and Fpz locations. Initial model development using only the raw EEG data showed room for improvement, so essential features were extracted from each channel for model training. We extracted features using three linear measurements and three nonlinear measurements. The linear features extracted for training are maximum, mean, and standard deviation. The nonlinear features extracted for training are skewness, kurtosis, and mean absolute Fast Fourier Transform. Training and testing data was split using a ratio of 0.70 to 0.30. The model structure is a 2-class neural network developed using Azure ML. The experimental results indicate that the selected three-channel EEG features can distinguish between healthy control subjects and subjects with depression. The classification accuracy score is 68.79%, and the true positive vs false positive area under curve (AUC) score is 75.02%. Some potential applications of our findings are the ability to aid in early medical diagnosis of depression and to provide a measurement for medicine effectiveness.

B. Walker, Y. Liu, Actuarial Science, Maryville University. **TEXT MINING IN COVID-19 TWEET SENTIMENT.** The objective of the research in this presentation is to utilize advanced text mining techniques and predictive modeling to uncover trends in public sentiment around Covid-19 through Tweets. Text mining extracts important tokens from raw tweets and transforms data into a form usable for predictive models. Pipelines, grid search, and various models including random forests, logistic regression, and support vector machine are trained on data processed by text mining techniques. The most effective model is employed to forecast the sentiment of tweets withheld from training and performance is assessed through confusion matrices. Applications of text mining in congruence with predictive models include marketing strategies, improved operation through feedback, political campaigns, pricing, and beyond.

Poster Presentations

N. Fonseka^a, J. Goddard^b, A. Henderson^c, D. Nichols^c, and R. Shivaji^c, ^aDepartment of Mathematics, Actuarial Science, and Statistics, University of Central Missouri, ^bDepartment of Mathematics, Auburn University at Montgomery, ^cDepartment of Mathematics and Statistics, University of North Carolina Greensboro. **EFFECTS OF MATRIX HETEROGENEITY ON POPULATION PERSISTENCE.** We study the structure of positive solutions to steady state reaction diffusion equation of the form

$$\begin{cases} -u'' = \lambda u(1 - u); & (0, 1) \\ -u'(0) + \sqrt{\lambda}\gamma_1 u(0) = 0 \\ u'(1) + \sqrt{\lambda}\gamma_2 u(1) = 0 \end{cases},$$

where $\lambda > 0$ is a parameter which encompasses patch size and γ_1, γ_2 are positive parameters related to the hostility at the boundaries 0 and 1, respectively. Note here that the parameter λ influences both the equation and the boundary conditions. In this paper, we establish existence, non-existence, and uniqueness results for this model. In particular, we establish exact bifurcation diagrams for this model, first when γ_2 is fixed and γ_1 is evolving, and then when the Dirichlet boundary condition is satisfied at $x = 0$ ($u(0) = 0$) and γ_2 is evolving. In each case, our results are established combining a quadrature method and the method of sub-super solutions. Finally, we present some numerical results that we obtained for this model. Here, we numerically simulate how the parameters γ_1 and γ_2 affect the minimum size for λ beyond which a positive solution exists. This model arises in the study of steady states for a population satisfying a logistic growth reaction and diffusing in a region surrounded by two exterior hostile matrices, and λ is related to the minimum patch size for existence of a positive steady state.

Conservation Section

Oral Presentations:

T. Cook and T. Roy, Department of Biology, Missouri Western State University. **WHAT'S TRENDING? AN INVESTIGATION OF PRAIRIE DICOTS USING OCCUPANCY MODELING AND TRANSECT SURVEYS.** Prairie ecosystems are an important focus of modern conservation efforts. Our region was once dominated by a prairie landscape, but has lost nearly all of the native prairie to woody encroachment, agriculture, and urbanization. The prairies that remain are vital to sustaining a diversity of mammals, birds, and insects. Our study was conducted on the John Rushin Teaching and Research Prairie, a newly restored 14-hectare tall-grass prairie with a large composition of legumes, asters, and milkweeds. These groups in particular are used by many endangered species, and are important for ongoing conservation efforts. The goal of this project is to understand the distributions and concentrations of key groups of native prairie plants, with a focus on dicot species. Occupancy modeling provides a unique opportunity to understand the extent of species diversity across the prairie. By modeling the predicted occurrences of various species, we can gain insights into new management techniques and allow us to monitor the effectiveness of our management on invasive species.

M. S. Mills¹, D. M. Drake², A. Elias¹, C. Ganong¹, M. L. Grantham¹, K. A. Koy¹, and K. L.W. Walton¹, ¹Department of Biology, Missouri Western State University, ²Department of Geography & Environmental Sustainability, University of Oklahoma. **A UNIQUE, POND-FOCUSED INTERDISCIPLINARY RESEARCH TEAM FOR UNDERGRADUATE EDUCATION.** The benefits of undergraduate research experiences are well-documented; however, structured interdisciplinary research experiences can be difficult to organize at smaller, primarily undergraduate institutions (PUIs). In fall 2020, we formed an interdisciplinary research team focused on the nine ponds on the MWSU campus. Faculty research areas include ecology, virology, geology, geography/GIS, physiology, and organismal biology. Our goals were to (1) provide undergraduate students with an authentic research experience and (2) improve students' science process and communication skills. Students sign up to conduct research in a specific faculty member's lab, and the entire team meets weekly for research presentations or workshops on scientific skills (e.g., preparing posters and presentations, managing data, creating graphs using Excel, etc.). At the end of each semester, students present their work in a departmental poster symposium. Students complete surveys on aspects of the program at the beginning and end of each semester, as well as a validated survey for self-assessment of gains in specific research skills at the end of each semester. This program has led to 24+ conference presentations with multiple student coauthors. Analysis of students' paired survey responses has shown gains in a wide range of skills, such as ability to collaborate and ability to explain their research to a broad audience. Students have frequently reported greater confidence, increased interest in graduate studies, and strengthened academic skills. In conclusion, this interdisciplinary team is a unique, successful model for undergraduate research experiences at a PUI.

M. S. Mills and E. Sweet, Department of Biology, Missouri Western State University. **A LONG-TERM STUDY OF AN URBAN TURTLE METAPOPULATION.** Long-term studies of turtle populations that live in ponds or wetlands often fit a metapopulation model, with turtles moving among ponds and recolonizing ponds or wetlands after drying events. However, few studies have examined turtle metapopulation dynamics in urban environments, and we are unaware of any long-term studies of urban turtle metapopulations. We have been studying turtle populations

in nine ponds on the campus of Missouri Western State University in St. Joseph, MO, since September 2008. We have over 800 captures of five native species (*Chelydra serpentina*, *Chrysemys picta bellii*, *Trachemys scripta elegans*, *Apalone spinifera*, and *Graptemys pseudogeographica*) and three non-native subspecies (*Chrysemys picta marginata*, *Trachemys scripta scripta*, and *Trachemys scripta troostii*). Over this period three ponds have either dried naturally or were drained, with turtles emigrating, then recolonizing these ponds. Urban areas present challenges to population growth and movement among ponds that are generally not encountered in more natural habitats. We documented that approximately 18% of recaptured turtles moved between ponds over distances of 115-875 m, with no significant differences in movement between sexes. Turtles moving among ponds often crossed roads and maneuvered around parking lots and buildings. We provide a general overview of our findings and will discuss population trends as well as factors that may affect these turtle populations, including: proximity of roads and buildings, presence of fish, pond size, and pond drying events. The results of this long-term study are important in the context of documenting metapopulation dynamics of turtles in an urban environment.

A. Reichert¹, Y. Ge², G. Bai², and M. Murad², ¹Department of Biological Sciences, Central Methodist University, ²Department of Biological Systems Engineering, University of Nebraska-Lincoln, Lincoln. **HIGH-THROUGHPUT PHENOTYPING ANALYSIS OF SOYBEAN PHOTOSYNTHETIC CAPACITY VIA LEAF HYPERSPECTRAL DATA AND MACHINE LEARNING.** Using high-throughput phenotyping techniques will help increase agricultural productivity. Photosynthesis is an important natural process in plants that can convert solar energy into food, feed, fiber, and fuel, which is vitally important for the survival and prosperity of humanity and society. The goal of this research is to develop and validate a rapid non-destructive method for estimating the photosynthetic capacity of soybeans. Experimental data was collected from four soybean plots with a Li-COR 6400xT and an ASD spectrometer, for two photosynthetic parameters ($V_{c,max}$ and J_{max}) and leaf hyperspectral reflectance, respectively. Partial least squares regression models will be developed to predict $V_{c,max}$ and J_{max} from the leaf hyperspectral data.

Poster Presentations:

C. Chevalier. Department of Biology, Missouri Western State University. **STUDENT ORGANIZATIONS CAN BE IMPORTANT PROFESSIONAL DEVELOPMENT VEHICLES FOR APPLIED LEARNING EXPERIENCES: THE MWSU STUDENT CHAPTER OF THE WILDLIFE SOCIETY EXAMPLE.** Almost Every college/university has student organizations, each addressing an area of interest to some students. A constant challenge of any student organization is attracting and retaining active members. Undergraduates have lots to do in the four short years they have, on average, to become competitive for the coming job market or graduate school. Student Chapters of The Wildlife Society are no exception. I herein offer some observations as to what sets an excellent Student Chapter apart from others. Student Chapters must have a clear mission and relevant goals. These must be known and understood by all student members and their faculty advisor(s). The Student Chapter must have an involved faculty advisor whose work unit understands and supports his/her efforts. There must be demonstrable “context” to the students’ professional development. Students must be empowered and encouraged, but guided, to develop and lead their organization. The Student Chapter should address

what I call the “*Trilogy Success*”: *Leadership of development, Skill development, and Professional development*. The Student Chapter must be integrated into the degree program culture. I suggest it be considered as a “Capstone Applied Learning Experience” that begins when the students join, and continues until graduation. The Student Chapter should have demonstrable context relating to the students’ degree requirements, and reinforce and extend experiences begun in the course environment (lecture and/or lab). The strategic purpose of a Student Chapter should be to provide Applied Learning through the Trilogy of Success mentioned above outside the traditional classroom format.

J. Olberg¹, J. Gelhaus², B. Stephens³, B. Landwer⁴, and W. Mabee¹, ¹Missouri Department of Conservation, Central Regional Office and Conservation Research Center, ²Academy of Natural Sciences, Drexel University, ³Missouri Department of Conservation, Ozark Region Office, ⁴Missouri Department of Conservation, Northeast Region Office. **A NEW CRANEFLY (DIP-TERA: TIPULIDAE) RECORD FOR MISSOURI.** We report the first record of occurrence in Missouri for the cylindrotomid crane fly *Liogma nodicornis*, which also represents a range extension for the species into Midwestern North America. A larval specimen was identified from an aquatic macroinvertebrate community sample taken in the South Prong of the Little Black River, located in the Ozark Highlands (Ripley County), in September 2021. Select physical and water quality characteristics from the site are also presented.

T. Wilson, C. Burandt, and A. Newton, Department of Biology, Missouri Western State University. **VIDEO MONITORING TO OBSERVE POLLINATORS IN A RECONSTRUCTED TALLGRASS PRAIRIE.** Pollinator biodiversity is important for the health of our ecosystems. Many pollinator species are currently experiencing population declines caused in part by reduced habitat availability. In 2020, the 36-acre John Rushin Teaching and Research Prairie was established on Missouri Western State University’s campus to create habitat for native wildlife, including pollinators. To gauge the success of the John Rushin Prairie with regard to pollinators, we used video recording methods to identify species that visited plants in the prairie from June – October 2022. We accumulated 123 hours of footage and confidently identified 6 *Bombus* bees, 17 lepidopteran species, and 23 other pollinators. Most of the organisms we identified were native and several declining species were noted. Our findings suggest that the John Rushin Prairie is attracting a diverse variety of pollinators and that video recording methods can be a useful tool in identifying pollinators and their behaviors.

Geography Section

Oral Presentations:

A. Batmunkh and C. Blodgett, Department of Geography, University of Missouri – Columbia. **U-NET ARCHITECTURES FOR IMPERVIOUS SURFACES SEGMENTATION FROM HIGH-RESOLUTION AERIAL IMAGERY.** The rapid urbanization of landscapes presents significant environmental and ecological challenges, necessitating the precise mapping of impervious surfaces. This study aims to leverage the capabilities of deep learning, specifically U-Net architectures, for the semantic segmentation of impervious surfaces from high-resolution aerial imagery. Our approach modifies the conventional U-Net architecture to enhance its efficiency and accuracy in handling the spatial complexity of urban landscapes. We utilized a dataset comprising aerial images from multiple urban and suburban areas within the city limits of Columbia, Missouri, annotated for training, validation, and testing. The U-Net model was trained using these datasets, with particular attention to optimizing layer configurations and hyperparameters to improve model generalizability across diverse environments. Performance was evaluated based on accuracy, precision, recall, and intersection over union (IoU) metrics. Our results demonstrate an improvement in the segmentation of impervious surfaces compared to traditional U-Net architecture. The modified U-Net model achieved an accuracy of 94.4%, a precision of 93.6%, a recall of 93.2%, and an IoU of 87.7%, underscoring its effectiveness in delineating impervious areas with high precision. These findings highlight the potential of advanced deep learning models in remote sensing applications for urban planning and environmental monitoring.

T. Thomas and G. Elliott, Department of Geography, University of Missouri – Columbia. **VARIABILITY IN OAK AND MAPLE AUTUMN TREE PHENOLOGY ACROSS OAK-HICKORY STANDS IN ROCK BRIDGE STATE PARK, COLUMBIA, MISSOURI.** This project aims to examine the relationship between phenophase duration and species variation among oak-hickory dominated forests in Columbia, Missouri. We used high-resolution field-based observation methods on time scales from weekly to every other day visits to the trail sites over a five-year period (2018-2022). Data was recorded using a phenophase scale, with values from 800 and ending at 899, which gives each tree a status of canopy color. We investigated three key phenophases including onset color change, peak color change, and full canopy color change. Then, mean duration of each phase was analyzed using ANOVA models and combined with interannual temperature data to examine significant relationships between time, climate trends, and intraspecific species response. We are currently working to complete the results of this study, but we are expecting to see statistically significant intraspecific variation with a standard deviation of ~3 days in sugar maple and ~5 days in oak species at peak color change status, and about a 20-day variation in interspecific species from oak to maple based on previous studies in similar deciduous forest stands of the eastern United States. This research will serve as a base study to be iterated on in future projects to create more in-depth predictive models for the local deciduous forests in Rock Bridge State Park, Columbia, MO.

Poster Presentations:

S. Tuck, Department of Geography, Geology and Planning, Missouri State University. **NOT TOO SMALL TO MAKE A DIFFERENCE: NATURAL RESOURCE EDUCATION IN ZAMBIAN PRIMARY SCHOOLS.** Zambia holds access to key mineral resources, as well as water supplies, that support numerous Sub-Saharan African Countries. This study aims to reveal disparities in education of water and mineral sources between rural and urban settings within Zambia. The study was brought to life by a team from Missouri State University that conducted voluntary interviews with primary school students in the sixth and seventh grade in two of Zambia's provincial capitals, Livingstone and Chipata. Students answered three questions; the data were analyzed to determine the total number of students with "full knowledge," "partial knowledge," and "no knowledge" of Zambia's natural resources. The data collected revealed that, out of the 832 credible interviews, most of the students have at least partial knowledge of natural resources in both provinces.

Geology & Geosciences Section

Oral Presentations:

D. Schmidt and L. Vanek, Department of Environmental Science and Geology, Westminster College. **EXPERIMENTAL TAPHONOMY: DETERMINING POSSIBLE LEAF DEGRADATION OF FOSSIL PLANT ASSEMBLAGE.** An assemblage of plant fossils were collected from a road cut near the View High Drive and I-470 intersection in Kansas City, MO in 1997. These fossils, referred to as the View High Drive (VHD) assemblage, were preserved as a carbonized film within the Winterset Member of the Dennis Formation (Pennsylvanian). Most of the identified taxa show signs of degradation, particularly the fern, *Alethopteris*. This research focuses on the potential driving mechanisms of degradation observed in fossilized leaves by using two parameters: 1) simulated experiments, and 2) comparisons of rock type and fossilized content between different assemblages. Simulated experiments used *Polystichum acrostichoides* leaves to gain a better understanding of taphonomic processes responsible for the physical condition of fossilized fern leaves. Physical transformations of *P. acrostichoides* in fluvial transportation and lagoonal post-deposition simulations were recorded. Fluvial simulations demonstrate a systematic removal of lower pinnae along the central rachis over time. *Alethopteris* specimens from the VHD assemblage exhibit a similar physical appearance to *P. acrostichoides*. Preliminary observations of leaves in the lagoonal post-depositional simulation exhibit microbial activity along the central rachis and pinna rachis where nutrient concentration is greatest. Comparisons of the VHD assemblage to a second locality, referred to as the Mill Creek (MC) assemblage, demonstrate apparent differences in preservation and concentration. The MC assemblage possesses specimens with stronger preservation and greater concentration (~39%) of plant parts than the VHD assemblage (~6%). Thus, we propose the VHD specimens represent an allochthonous assemblage that experienced physical degradation from transportation.

M. Waterman and K. Mickus, School of Earth, Environment, & Sustainability, Missouri State University. **MAGNETIC AND GRAVITY ANALYSIS AND CRITICAL MINERAL EXPLORATION IN THE NORTHWEST SUPERIOR PROVINCE, MINNESOTA.** The Superior Province which is an Archean-aged craton, covers approximately 132,000 square miles across south-central Canada and the north-central United States. The Superior Province in Minnesota consists mainly of a variety of granitic and granitic-type intrusions with lesser amounts of metamorphic lithologies formed by a series of orogenies ranging between 2.8 to 2.6 Ga. The Minnesota Orogeny was the last accretion event and covers most of west-central Minnesota. Additionally, within the Superior Province in northwestern Minnesota, there are minor amounts of Cretaceous clastic sediments, and all bedrock rock units are covered by a thin layer of glacial deposits. The Superior Province is host to numerous world-class ore deposits including banded-iron formations, volcanogenic massive sulfides, and granitoid-hosted gold and copper deposits. Northwestern Minnesota is largely unexplored in terms of potential ore deposits due to the lack of outcrops and detailed geophysical and geochemical surveys. To remedy this situation, a high-resolution aeromagnetic and radioactivity survey was conducted as part of the USGS Critical Mineral program. In conjunction with the available gravity data, a geophysical analysis will be conducted that involves creating a variety of residual and derivative anomaly maps and two and three-dimensional gravity and magnetic models that will be correlated with the available geochemical data. Preliminary gravity and magnetic anomaly maps indicate gravity and magnetic

minima on the Bouguer, reduced to the pole magnetic, and residual gravity and magnetic anomaly maps correlate with Archean granite intrusions while gravity and magnetic maxima correlate with banded-iron formations and basaltic dikes. The larger scale gravity and magnetic anomalies all on maps trend SW-NE while the anomalies due to the iron formations and dikes trend SE-NW. The derivative analysis confirms the above and provides more exact location of the source bodies. Future work involves creating additional residual anomaly maps, and subsurface models and using machine learning methods in conjunction with geochemical data to predict which areas are best for more detailed mineral exploration.

H. Sadiq, J. Adams, H. Ali, J. Smith, J. Woodard, J. Burris, and S. Orimaye, College of Global Population Health, University of Health Sciences and Pharmacy in St. Louis. **DEVELOPING FLOOD MITIGATION STRATEGIES USING AN INCIDENT REPORTING SYSTEM AND ARTIFICIAL INTELLIGENCE FOR UNIVERSITY CITY, MISSOURI.** This project aims to collect data to support University City flood mitigation strategies benefitting community members who are vulnerable to flood-related events. We collaborated with several community partners, such as the University City Commission on Storm Water Issues, Army Corp of Engineers St. Louis District, Metropolitan St. Louis Sewer District, and International Business Machines (IBM) develop a model that can predict where flooding will occur in University City. To build our prediction model, we used land use and environmental variables such as impervious surfaces, location coordinates, and elevation values of areas previously affected by flooding. In addition, we created an incident reporting system equipped with an AI-driven chatbot that prompts users to report flood-related events. This user-friendly reporting system asks users a series of questions regarding basement flooding, yard erosion, velocity and origin of the flood, and other related factors to provide real-time data that can help improve the flood prediction model. This data is accessed using the IBM Watson X Application Programming Interface (API) to connect to the incident reporting system. The predictive model will ultimately protect communities susceptible to flooding and support mitigation techniques aimed at appropriately being prepared for flooding events.

S. Abdullah^{1,2} and A.Y. Kwarteng², ¹School of Earth, Environment, & Sustainability, Missouri State University, ²Geological Engineering Department, University of Mine and Technology, Ghana. **MINERAL EXPLORATION OF HYDROTHERMAL ORE DEPOSITS USING REMOTE SENSING IN THE ASHANTI BELT.** Remote sensing imagery has been utilised successfully in several geological mapping and mineral exploration projects. This study discusses the use of remote sensing for mineral exploration of hydrothermal ore deposits in the Ashanti Belt, southwestern, Ghana. Landsat 9 and an SRTM 1 Arc-second Global DEM were used to map lineaments and delineate hydrothermal alteration zones using an automatic lineament extraction technique and band ratio methods. Iron oxides, ferrous minerals and clay minerals alterations were mapped using band ratios 4/2, 6/5 and 6/7 respectively. The findings of this study show that clay minerals alteration is the predominant hydrothermal alteration within the Belt. The predominant lineament trend was mainly in the NE-SW direction. Areas of high to medium-density lineaments and high ferrous and iron oxide alteration are the most susceptible areas for mineral exploration. Approximately 80% of the known gold mines within the study area affirm the criteria.

C.E. Boston, Department of Social and Behavioral Sciences, Lincoln University. **ARCHAEOLOGICAL EVIDENCE OF CHANGING AGRICULTURAL TECHNOLOGY AND PRODUCTION AT THE DON CARLOS (HISTORIC SITE).** Very little is currently known about the history of rural Missouri, particularly in Cooper and Moniteau Counties. This necessitates active archaeological investigations, which have been on-going since 2017 at the Don Carlos Site outside of Prairie Home, Missouri. This study is a continuation of research concerning the Don Carlos's life at their second home, focusing specifically on the changing agricultural technologies and modes of production employed by family members over two generations. The archaeological records demonstrate that the family was using seemingly locally available and popular means of agricultural technologies and techniques to clear, cultivate, and harvest their lands. The archaeological evidence demonstrates a trajectory of simple but efficient tools, followed by an investment and the utilization of more advanced equipment, all of which is in line with popular trends of the era. This study demonstrates that the Don Carlos family was no different than their more widely studied neighboring communities and people who resided along the Missouri River, potentially providing greater insights into the farming livelihoods of other rural farmers.

Poster Presentations:

J. Goforth and D. Schmidt, Department of Biology and Environmental Science, Westminster College, Fulton, MO. **PETROGRAPHIC ANALYSIS OF PALOZOIC STRATA, SOUTH-EAST CALLAWAY COUNTY, MISSOURI.** In the summer of 2023, three major divisions of massive-bedded carbonates within Paleozoic strata along an outcrop of County Road 419 in Callaway County, Missouri were observed. Because little is known about this outcrop, the exposure of massive-bedded carbonates provides a unique opportunity for student research. The goal of this study is to make inferences about the depositional environment and geologic history of this location using petrography. Three massive carbonate beds were sampled for petrographic analyses. Within each massive bed, three vertical sampling zones were established. Upon analysis of these thin sections, several samples contained ooids which form in warm shallow marine conditions by wave agitated water. Thin sections also revealed peloids along with visible microfossils as well as clay-rich microcrystalline matrix surrounding carbonate and quartz grains. Other samples exhibit diagenetic alteration to mosaic and microcrystalline quartz (chert). Collectively, these analyses suggest initial deposition reflective of shallow, tropical, marine conditions with later periods of authigenic diagenesis. Those samples possessing diagenesis exhibit portions of the relic structures, like allochems and skeletal grains, being present, however most of the structure has been replaced by microcrystalline quartz. Furthermore, we propose minor shifts in environmental conditions being responsible for subtle carbonate variations vertically. Within the three massive beds, samples exhibit vertical alternation of fine-grained clayey carbonates, allochems zones, and sandy carbonates..

F. Mcroberts, and D. Schmidt, Department of Biology and Environmental Science, Westminster College. **DETERMINING VERTEBRAL POSITION ALONG THE AXIAL SKELETON OF A NEW CERATOPSIAN FROM GRAND RIVER NATIONAL GRASSLANDS, SOUTH DAKOTA.** In the summer of 2020, a Westminster College field team led by Dr. David Schmidt, discovered a *Triceratops* (GRNG-Tr-20) known as “Shady”. Since its discovery, a number of taxonomic and taphonomic projects have been conducted on GRNG-Tr-20. With each summer, new vertebrae are recovered and much of the dorsal vertebral section is represented. However, it is uncertain of the vertebral position of each dorsal vertebra along the axial skeleton. Thus, the goal of this study is to differentiate between cervical, dorsal, and caudal vertebrae and determine the vertebral position of each. To accomplish our goal, we collected both qualitative and quantitative data from specimen GRNG-Tr-20 and compared it to *Triceratops* specimens from the Smithsonian’s (PAL500000), Burpee (BMRP 2006), and baby specimen, known as “Lori”. Plotting the vertebral height and transverse process width showed a size relationship of the three specimens that was expected. However, the increase in size of each successive vertebrae along the axial skeleton showed variation. Only the Smithsonian specimen exhibited a trend that was expected for each successive vertebra. However, we believed that the data found on both “Lori” and BMRP 2006 could still be useful. Using these size relationships, we were able to compare vertebrae from GRNG-Tr-20 and determine the vertebral position of at least one dorsal vertebrae (DV16) and one caudal vertebrae (CA2). Continued efforts using combined qualitative and quantitative comparison will ultimately assign positions for all GRNG-Tr-20 vertebrae.

D. Rosales-Foster, E. Siebert, D. Schmidt, Department of Environmental Science, Westminster College. **BRACHIOPOD ABUNDANCES AND DIVERSITY OF THE MIDDLE CREEK MEMBER: AN INTERPRETATION OF ENVIRONMENTAL CONDITIONS.** At the Firefighter’s Memorial site off of 87th Street in Kansas City, Missouri, an exposure of Pennsylvanian strata contains a highly fossiliferous limestone called the Middle Creek Member. This is densely packed with various, diverse marine invertebrates but has the greatest diversity among brachiopods. The occurrence of many brachiopod varieties provides the unique opportunity to gain a better understanding of the rich fossiliferous nature of the Middle Creek Member. In February of 2024, an excursion resulted in the evaluation of the number of brachiopod taxa represented and their relative abundances. Data was recorded from 6 different sites along the exposure. A surface collection method was employed, where exposed brachiopods were identified and recorded. Unidentifiable brachiopods were collected and identified at a later date. Abundance ranged at each site from 76-240 brachiopods per site. *Neochonetes* were the most abundant, even making up 130 out of 189 brachiopods in one section (21%-69% of each section). *Hustedia* followed (7%-43%), and the least abundant was *Wellerella* (0%-0.004%). Brachiopods are important indicators for dating rock formations and reconstructing ancient environments. Using the data collected, research was done to help us reconstruct and understand what the ancient environment was like during the late Pennsylvanian..

H. Weakley¹, O. Adojoh^{1,3}, K. Haberyan¹, Y. Zhang², and S. Beverly³. ¹Department of Natural Sciences, Northwest Missouri State University, ²University of Southern California, and ³Case Western Reserve University. **HOLOCENE PALEOCLIMATE AND PALEOECOLOGICAL RECONSTRUCTION OF THE CENTRAL BASIN, LAKE ERIE: NEW INSIGHTS FROM DIATOMS AND POLLEN.** We used diatom and pollen records to clarify paleoecological changes in Lake Erie. Seven samples between 100 and 1000 cm were collected in a 10 m core (Core 84A) and examined for diatoms and pollen. For diatom analysis samples of approximately 0.300 g were processed with nitric acid, rinsed, mounted, and examined at 400x. While diatoms in most samples were apparently lost to alkaline dissolution, we did find diatoms at ~987 cm (~10000 cal yBP; one specimen of *Gyrosigma*), at ~299 cm (~2500 cal yBP; very rare and corroded *Aulacoseira granulata*, *Stephanodiscus niagarae*, and *Encyonema*) and at ~185 cm (~1800 cal yBP; numerous specimens of *S. niagarae*). The persistence of these thickly-silicified valves of the planktonic *S. niagarae* suggests elevated silicon:phosphorus ratios, a temperature near 18 oC, and dissolved oxygen near 10 mg/L. Pollen analysis revealed four zones between 20 and 1000 cm that correspond to changes in the geochemistry records (i.e. carbon:nitrogen; organic:inorganic) and which indicate a change in climate and paleoecology. Interestingly, Zone IV (20 – 250 cm, ~800-2000 cal yBP) shows a significant increase in disturbance taxa such as *Ambrosia* sp. (ragweed), Cyperaceae (sedges), Poaceae (grasses), and phytoclasts (charcoal). This indicates early deforestation, wildfires, and pre-Columbian agriculture during the Medieval Warm Period and the arrival of Europeans (~1640-1850 cal yBP). Further pollen and diatom analysis is needed, especially between 50-20 cm, to detect Holocene environmental changes, including human influences such as eutrophication. Such analysis should elucidate the anthropogenic impacts on Lake Erie.

B. Parthasarathy and M. McKay, School of Earth, Environment, & Sustainability, Missouri State University. **GEOLOGY OF BARTON QUADRANGLE, ALABAMA AND PROVENANCE OF HARTSELLE SANDSTONE USING GEOCHRONOLOGY.** The Barton 7.5-minute quadrangle in northwestern Alabama contains upper Mississippian strata of the Tuscumbia Limestone, Pride Mountain Formation, Hartselle Sandstone, and Bangor Limestone. The Mississippian section is unconformably overlain by Cretaceous strata of the Tuscaloosa Group and unconsolidated Quaternary alluvium. The Tuscumbia Limestone, exposed in the lowest portions of valleys and correlates to a period of low clastic influx during shallow basin conditions. The overlying Pride Mountain Formation, a shale-dominated unit with interbedded limestone and sandstone intervals, represents the initiation of clastic sedimentation in the Black Warrior basin. The overlying Hartselle Sandstone records the culmination in clastic influx within very fine to medium grained, white to tan, cross bedded sandstone that are interpreted as a Mississippian barrier island complex. The overlying Bangor Limestone, a dark gray to black, commonly micritic limestone represents restricted basin conditions, with a decrease in clastic sediment, and an increase in the accumulation of organic material. The provenance of sediment within the Hartselle Sandstone may offer insight into the basin dynamics active during early orogenesis. We will present U-Pb zircon, apatite, and rutile data to assess models for the routing of clastic sediment into the Black Warrior basin, including a (1) continental drainage system (similar to the modern Mississippi River), and (2) locally sourced, orogenic system (similar to the Brahmaputra River drainage in and from the Himalaya Mountains).

Physics & Engineering Section

Oral Presentations:

S. Cope, A. Baran, Department of Physics, Astronomy and Material Science, Missouri State University. **A PHOTOMETRIC SURVEY OF VARIABLE STARS IN THE OPEN CLUSTER NGC 188.** NGC 188 has been researched extensively, including surveys finding short term pulsators. Most of the past literature did not have surveys with a longer temporal baseline, leaving room for new contributions to the field of astronomy. A 6-month photometric survey of the old open star cluster NGC 188 is discussed. Using the CDK20 Planewave telescope at Missouri State University's Baker Observatory, photometric data of a 12' by 12' field of NGC 188 is being collected and analyzed. About 40 nights of data have been collected so far. This study will ideally result in the discovery of new pulsators and other variable stars. Additionally, previously discovered variable stars will be analyzed with a longer baseline, revealing the long-term behavior these stars exhibit. GAIA data will be employed to discuss the evolutionary status of these stars, with the goal to find an independent age and distance to the cluster. This work is funded by Missouri State University and the Missouri Space Grant Consortium.

G. Vatrano, Department of Physics, Astronomy, and Materials Science, Missouri State University. **EFFECTS OF ANNEALING IN A REDUCING ATMOSPHERE ON LITHIUM COBALT OXIDE.** The reduction of lithium cobalt oxide (LCO) in a H₂ atmosphere is used to cause oxygen vacancies which will improve specific energy by allowing easier lithium migration. The reduced LCO can potentially be used for cathode materials in lithium-ion batteries. A systematic study of annealing at 300°C and 400°C for time durations of 30, 60, 90, and 120 minutes in an Ar/H₂ 95%/5% atmosphere was conducted. Characterization of the samples will be done using X-ray diffraction, Raman spectroscopy and SEM. Preliminary results show oxygen vacancies as evidenced by a shift in the z-axis position for oxygen in all samples and movement of the X-ray diffraction peaks by up to 1 degree along with changes in intensities for all samples. Coin cell batteries will be fabricated and characterized using electrochemical impedance spectroscopy. This will show the effect of the oxygen vacancies on the performance of the battery. If successful, this will increase the specific energy of lithium-ion batteries and can be implemented into industrial and commercial applications.

Nga Nguyen, Religion Department, Missouri State University. **BUDDHIST PHILOSOPHY AND QUANTUM PHYSICS.** In quantum theory, all interactions occur through the exchange of particles, and in electromagnetic interactions, these exchanged particles are photons, nucleons and mesons. The interaction between electrons and atomic nuclei is the basis of all solids, liquids, gas and also all living organism of the biological processes associated with them. Hence, the world that we identify exists in relation to us and perform the function that we attribute to it, does not exist intrinsically or absolutely. Quantum mechanics unequivocally shows us that a number of basic concepts essential to our understanding of the phenomena world fail to have any meaning when our focus narrows to the microscopic realm. Sunyata (E. emptiness), the central notion of Buddhist philosophy, is the ultimate nature of things, it means that the things we see around us lack any autonomous or permanent existence. All things are empty is the concepts through which one constructs experience are unintelligible. Emptiness also means that all things are devoid of nature, character and function. They have no essence and only a relative

manifestation. So, particles in the matter are purely local condensations of the field, concentrations of energy that come and go, losing their individual character. In Buddhist perspective, all conditioned phenomenon has a discrete, independent reality, solid ontological status by our language of subjects and predicates, is just a flux of the dots which continuously arise and pass away every moment.

Poster Presentations:

S. Girn, S. Morrison, C. Witt, M. Guerra Toro, Department of Physics Astronomy and Materials Science, Missouri State University. **OUTCOMES OF SUPER-EARTH FORMATION IN THE PRESENCE OF A JUPITER-LIKE OUTER PLANET.** Super-Earths are found to be the most common planets closest to their host stars. They are defined as planets ranging slightly larger than Earth to the size of Neptune. However, in our solar system, we do not have any super-Earths, one of the reasons could be because of Jupiter. For this project, we analyzed how a big outer planet like Jupiter can affect the formation of inner planets. We performed ninety-two N-body simulations replicating planetary formation in a protoplanetary disk where we placed a Jupiter-sized planet 5 AU from its host star. First, we looked at outcomes for when the protoplanetary disk is present, and then when the disk is gone. We then compared the results from these simulations to ones without a large planet. At lower densities, we saw more planets formed in both cases. The average mass and eccentricity of the inner planets were higher in systems that did not contain an outer Jupiter. Additionally, there was a tendency for the average number of planets produced to be higher in simulations with an outer Jupiter. We will discuss which parts of these simulations we can see using exoplanet surveys that look for planets passing in front of their stars.

B. Devkota, S. Morrison, S. Cope, Physics, Astronomy and Materials Science Department, Missouri State University, **ORBIT PERTURBATIONS TO HABITABLE ZONE PLANETS FROM A MASSIVE PLANET AT THE PRIMORDIAL WATER ICE SNOWLINE AROUND M STARS AND G STARS.** The search for extraterrestrial life depends on identifying planets with conditions conducive to their development. This research explores the impact of massive planets residing near the primordial water ice snowline on the orbital stability and habitability of Earth-mass planet located in the habitable zone of sun-like stars and M dwarfs (most common star). We employ simulations to track the orbital evolution of an Earth-mass planet and a massive planet. These simulations encompass various scenarios, including Earth-mass planets at diverse locations within the habitable zone, different shape of the orbit (eccentricity) and varying masses for the snowline giant – a Jupiter-mass planet for G stars and a Neptune-mass planet for M dwarfs. Our analysis examines the magnitude and timescales of orbital variations experienced by the habitable zone planet in each simulated scenario. The snowline is not as separated from the habitable zone around M dwarfs as for Solar type stars, so planets in the habitable zone of M dwarf stars are generally more strongly perturbed than that of G stars. These findings are crucial for understanding the orbital stability of potentially habitable planets, as well as the potential alterations in the amount of stellar radiation they receive. We will discuss these orbit perturbations and the change in solar flux received by the habitable zone planet.

Science Education Section

Poster Presentations:

E. Allison, Honors Program, Drury University. **PHYSICAL THERAPY TRAINING SINCE THE COVID-19 PANDEMIC: PERCEPTIONS AND SUGGESTIONS FOR CHANGES IN TRAINING.** This study explores the changes in work and training in the physical therapy field since the pandemic, as perceived by physical therapists and physical therapy students. Respondents were surveyed using a convenience sample obtained from postings on various physical therapy Facebook groups in Spring 2024. The survey was also sent to local physical therapists and personal connections. Respondents were asked to provide detailed information regarding their physical therapy training, their perceptions of the degree to which their training prepared them for the pandemic, and for suggestions on how physical therapy training should be improved in light of current conditions. The General Anxiety Disorder-7 (GAD-7) index was administered, as well as pertinent demographic questions. Preliminary results from 19 respondents show that most people are practicing in the field (47.4%) and have been since COVID-19 (68.4%). Respondents reported that their education provided them with the necessary skills and knowledge to practice in the field but did not feel as prepared for work during and since the pandemic. The results also showed that hands-on experience was preferred over writing or research literacy courses. Their stress levels currently and during the pandemic were also analyzed. Higher stress levels were reported during the pandemic and those levels have lowered currently. Implications for further changes to physical therapy training are suggested by the data and are further explored here.

D. Ashley, Department of Biology, Missouri Western State University. **I MADE MY STUDENTS CRAWL FOR THEIR APPLIED LEARNING EXPERIENCE.** BIO355 (Cave Ecology) was a course that emphasized the ecology of cave habitats. It reviewed information on biotic and abiotic factors that impact cave organisms, cave microhabitats, trophic interactions, evolutionary adaptations, and management of cave resources. Students were required to participate in several cave visits during which we conducted general bioinventories and quantitative nonlethal conservation monitoring of cave biota. These monitoring projects repeated standardized protocols and each cave visit added to the longitudinal dataset documenting that cave's biodiversity. This applied learning experience was a very positive component of this course. In addition to typical class assignments and exams, students were expected to complete a miniproject report on an aspect of cave ecology research that the class conducted during the semester. Students had access to the entire longitudinal dataset. A given student may have visited a given cave once for a 3-7 hour trip but that student might have access to a dataset that had been accumulating for ten years. The results of this project were presented at the end of the semester during our annual MWSU Multidisciplinary Research Day Poster Symposia. Students were also encouraged to consider presenting the results of their research at other off-campus professional meetings. This poster describes my approach in BIO355 and emphasizes the applied learning associated with the "Last Great Cave Trek".

A. Johnson, S. Hall, M. Carty, Department of Culture and Society, Park University. **A GENERATIVE AI LIED ON AN ETHICS CLASSROOM ACTIVITY.** Generative AI systems have made significant contributions in several fields since their recent emergence. One area of impact has been education. Generative AI can summarize articles, construct rubrics, identify sources, and answer questions - all of which can be useful tools for teaching and learning. However, generative AI may also produce fabricated or false information. This presentation aims to provide a cautionary example of using generative AI in the classroom by recounting an experience from an undergraduate ethics course. In the course, a generative AI system called Claude 1.2 hosted on Forefront.ai was utilized to generate a list of retracted psychology research articles for students to investigate and report on. The goal was for each student to examine a specific retraction and summarize their findings for the rest of the class. However, the listing contained fabricated examples. One of the examples featured in the list hallucinated an article title, even though it correctly identified an author involved in 13 article retractions. This experience highlights the need for careful evaluation of information generated by AI. The presentation will share the specific examples generated and allow participants the opportunity to judge whether each retraction was real or fabricated. The overall message is that generative AI holds promise as an educational tool, but also requires discernment, as it remains capable of producing confabulated information (and provide an ironic learning experience in an ethics course). Approaching its use in the classroom with awareness of this limitation can help maximize its benefits and minimize risks.

T. Eckdahl, Department of Biology, Missouri Western State University. **GENETICS OF THE DAY: APPLIED LEARNING IN A LECTURE ENVIRONMENT.** Lecturing in college classes is an efficient way to impart information to students. Tradition makes lecturing a default, but it is a form of passive learning, and there is a growing realization that most students cannot pay close attention to lectures for more than 20-30 minutes. Applied learning in the form of active learning strategies can be used to complement lecturing. This approach was developed for use in Genetics, a sophomore level lecture and laboratory course required for all Biology majors at Missouri Western. The applied learning modules were formalized as Genetics of the Day (GOTD) when lecture periods were 50 minutes, with one occurring each period. Halfway through each class, the students would engage in a Genetics Discussion of the Day, a Genetics Problem/Question of the Day, or a Genetics Activity of the Day. When the lecture periods were extended to 80 minutes, GOTD started happening twice during each class meeting. This report details the results of a survey that used a Likert scale and open-ended questions to learn Genetics students' views on GOTD as a learning practice and about the many specific GOTD experiences they had. The data support the continuation of GOTD as an applied learning practice in Genetics.

M. Mills, D. Ashley, Department of Biology, Missouri Western State University. **WEEKEND FIELD TRIPS AS AN IMPORTANT APPLIED LEARNING COMPONENT OF BIOLOGY COURSES.** Biology faculty teaching organismal/ecological courses are often limited by campus constraints when attempting to introduce students to biodiversity and standard natural resource research and management protocols. Their campus may consist mostly of manicured lawns and paved sidewalks and parking lots. There may be no appropriate habitat where

students could learn to be effective monitoring biota with standard insect nets, malaise traps, light traps, kicknets, seines, coverboards, small mammal traps, etc. Furthermore, some activities require more time than is normally available in a typical lab session in the student's schedule. Some campuses (i.e. MWSU) do have expanses of natural areas that can be sampled. However, it is educational to be able to expose students to unique habitats found off-campus in a different Missouri Eco-Region. Biology faculty at MWSU have utilized weekend field trips for many years as a major component of several upperclass courses. This poster describes our approach and the role of two off-campus facilities (The Ozark Underground Laboratory and Reis Biological Station) in providing applied learning opportunities to our students.

Social and Behavioral Sciences Section

Oral Presentations:

T. Barrett, Department of Social and Behavioral Sciences, Lincoln University. **THE RISK OF A NEW HENRIETTA LACKS? INCREASING AWARENESS ABOUT THE IMPACTS ON THE CONSUMER BECAUSE OF DIRECT-TO-CONSUMER GENETIC TESTING IN A U.S.-CENTRIC SETTING.** Direct-to-consumer (DTC) genetic testing allows consumers to learn about their genome from the privacy of their homes. This paper explores the potential effects on one's life after taking and submitting one of these tests. Many consumers submit to these tests as they allow for identity seeking, or the consumer's attempt to establish one's identity based on the results of these tests. The reported findings from the consumer's respective company could be either positive or detrimental to one's psyche. This most often ties into a person's ability to and confidence in reading their own tests and their trust in medical professionals. These tests further demonstrate ethical concerns that continue despite a decade of protests from consumers and healthcare professionals. Privacy concerns are seen, with new techniques from law enforcement raising questions on when privacy should be repealed to protect the community. Legislation has been attempted to protect consumers, with varying protections enacted by different countries. Despite all the above, the demand for DTC genetic tests continues to grow, necessitating further study into macro-level effects of DTC genetic testing on larger populations, as well as the intersectional effects of these tests on smaller, subgroup populations.

B. Bartels, N. Lightfoot, K. A. Braitman, Department of Psychological Science, William Jewell College. **IMPACT OF A GENERAL EDUCATION COURSE ON STUDENT WELLBEING.** College can be a stressful time for students. In recent years, college counselors have reported that more students than ever are seeking help for mental health concerns (Oswalt et al., 2020). One way that colleges are responding is by infusing wellbeing courses and material within the curriculum. In the current study, 25 students enrolled in a general education course on wellbeing completed measures of wellbeing at the beginning and end of the spring 2023 semester. The course introduced students to the science and practice of wellbeing, including how it can be operationally defined and measured. Students read and discussed scientific literature on habits and behaviors that promote and detract from wellbeing; learned about goal-setting and developed a plan for enhancing their own wellbeing; and completed assignments that encouraged the development of wellbeing practices. T-tests revealed statistically significant increases in self-reported positive emotion, satisfaction with life, meaning, and two measures of happiness, and a decrease in negative emotion ($p < .05$) with small to medium effect sizes. No significant changes were observed for engagement, relationships, accomplishment, health, loneliness, and gratitude ($p > .05$) although gratitude scores were high even at pretest. Data collection is being repeated this semester in the same course, along with a control group of students enrolled in a different general education course at the same college. Findings suggest that offering a general education course promoting the understanding and practice of wellbeing may be a way to encourage such practices among college students and have measurable impacts on their wellbeing.

D. Cole, School of Education and Social Sciences, Missouri Valley College. **LISTENING FOR CLUES: CORRELATIONAL STUDY ON MENTAL HEALTH AND MUSICAL EXPERIENCES.** This study investigates the intricate relationship between music, mental health, and personal identity, particularly focusing on young adults. Music serves as a universal language, facilitating emotional expression, self-regulation, and interpersonal connection. Drawing on interdisciplinary perspectives, this study examines how exposure to different musical experiences influences psychological states, highlighting the nuanced effects on emotional well-being. It also explores the concept of musical self-regulation, where individuals actively use music to cope with stressors and regulate emotions. The study focuses on how music might help regulate mood, especially under stressful situations. Music serves as a dynamic medium, allowing people affected by stress to express their emotions. Understanding these dynamic highlights music's therapeutic potential. The inquiry is around the recognition of individuals as active agents in their musical experiences. It investigates how listeners interpret and interact with music, which influences their identities, psychological well-being, and social behavior. This is reflected in the survey comprising 31 items on a Likert scale. The expected statistical significance will be higher in stress and depressive indicators in correlation with deeper identity to the choice of musical experiences. This research contributes to understanding how music influences mental health and personal identity development among young individuals, emphasizing its importance in navigating life's complexities and fostering resilience and social connections.

L. Day, School of Education and Social Sciences, Missouri Valley College. **THE RELATIONSHIP BETWEEN FAMILY STRUCTURE AND SUBSTANCE USE.** Previous research has indicated that families that deviate from the standard nuclear family, having two biological parents in the home, puts adolescents at a higher risk of substance use. This indicated to be especially true for children who resided in homes with deceased or absent fathers. Research also points to several other factors that come into play when examining the relationship between family structure and substance use; factors such as sex, peer influences, familial socioeconomic status, family support and many others. The current study looks at how family structure and dynamic impacts adolescent attitudes towards substance use as well as their choice to engage in these types of behaviors. The findings of research related to these topics are important in creating preventative measures and protective factors for young people who come from families that look differently than the standard biological mother and father. The current study shows that those who report growing up in a household that deviates from the nuclear family structure also report more accepting attitudes and more exposure overall towards substance use.

I. Durbin and M. Botta, Department of Behavioral Science, College of the Ozarks. **EXPLORING THE IMPACT OF ATTACHMENT STYLES ON COLLEGE STUDENTS' PERCEPTION OF GOD: A SURVEY STUDY.** The study aimed to investigate the association between attachment theory and individuals' perception of God. A total of 106 participants, comprising both males and females, enrolled as college students aged 18 years or older, completed a 16-question online survey. Chi-square analysis revealed a significant correlation between individuals with higher trust in their parents and their perception of God as closer, while those with lower trust in their parents perceived God as more distant, $\chi^2(4, N = 106) = 17.21, p = .002$. Analysis

of Variance (ANOVA) indicated no noteworthy disparity in prayer consistency concerning the proximity of God. Additionally, Pearson's correlation analysis showed no statistically significant positive linear relationship between phone call frequency and prayer consistency. These findings underscore the potential influence of attachment theory on individuals' conceptualization of God's proximity, highlighting implications for understanding interpersonal relationships and spirituality.

V. Farayola, Department of Political Science, Missouri State University. **TRUMP'S POPULISM AND INTERNATIONAL ORGANIZATIONS' RESILIENCE: A COMPARATIVE STUDY OF THE WORLD HEALTH ORGANIZATION AND THE WORLD TRADE ORGANIZATION.** While existing literature focuses on the "challengers" of international organizations, little attention has been given to how international organizations cope with and survive populist backlash. Drawing from the neo-institutionalist perspective, which emphasizes international organizations' commitment to self-preservation and growth, this paper argues that not all international organizations possess the necessary support systems to respond effectively to contestation while maintaining institutional growth and self-preservation. Using secondary sources, this paper analyses the ability of international organizations to respond to populist backlash and explains variations in their self-preservation strategies. This paper comparatively examines the responses of two task-specific international organizations, the World Health Organization, and the World Trade Organization, to the populist backlash from the Trump administration. This paper finds that an international organization's scope, bureaucratic structure, and external support networks affect its survival capabilities in the face of populist backlash. As populism becomes increasingly widespread, international organizations may face greater challenges. This paper offers valuable insights into the areas policymakers and scholars should focus on to enhance international organizations' resilience against future obstacles.

C. Fields, Psychological Science Department, University of Central Missouri. **STRESS IN AVIATION EDUCATION: A COMPARATIVE ANALYSIS OF COLLEGE STUDENTS.** Psychological stress and fatigue are major concerns for the aviation industry especially as it pertains to collegiate aviators. Collegiate aviators are expected to perform at their peak while completing flight commitments, managing general coursework, maintaining part-time employment, and partaking in extracurricular activities while balancing social life obligations and maintaining proper mental health. Heightened stress has been shown to have negative effects on working memory, by either reducing the number of cognitive resources that are available during the use of working memory or by reducing the amount of time in which these resources can be used. This depletion of working memory caused by the workload imposed on student pilots leads to repeated flight lessons, accidents, mediocre performance in academics, and in many cases problematic health. For this reason, I hypothesize that collegiate aviators will report higher baseline levels of stress compared to students in other departments. Additionally, I hypothesize that repeated exposure to stress will result in student pilots having a lower stress difference score compared to students in other departments. In other words, I believe that collegiate aviators will be less affected by stress than their counterparts.

L. Fincher and N. Meeks, Department of Behavioral Science, College of the Ozarks. **COUNTRY MUSIC REDUCES STRESS IN RURAL COLLEGE STUDENTS.** Many studies within the last 10 years have focused on the anxiolytic (anxiety-reducing) effects of classical music on the listener, often using populations with high-stress levels such as dementia patients and university students. This study investigated music's anxiolytic effect based on different music genres: including classical, jazz, country, pop, rap, and rock, and data were collected through an online survey. The population consisted of male and female students attending a small, private, liberal arts college in southwest Missouri. The survey utilized the Perceived Stress Scale and quantified average music-listening time. In addition, participants' music genre preference was collected. Results of this study, which are currently being processed, have revealed that stress-reducing effects of music are not solely specific to the classical genre, but are a benefit of several genres, including country music.

K. D. Hendrix^a, N. Cowan^b, and B. DuValla^a. Division of Behavioral Sciences, ^aSouthwest Baptist University, ^bDepartment of Psychological Sciences, University of Missouri-Columbia. **EXPLORING THE BOUNDARIES OF ATTRIBUTE AMNESIA: CAN AN INTERVENING TASK MODIFY HOW MUCH IS FORGOTTEN?** Attribute amnesia (AA) is the tendency to forget an attended attribute even though the attribute in question has recently been used to solve a problem. AA has been demonstrated by displaying arrays to participants and asking them the location of a letter within it repeatedly until eventually surprising them with an unexpected letter identity question before the expected location question. While earlier research on AA placed this surprise question between the stimuli and the expected question, the current study examined the limits of AA by moving the surprise question after the expected question. Ninety participants, divided into three groups, each completed 28 trials on Gorilla Experiment Builder. One group retained the original AA paradigm, one received the surprise question after the expected question, and one received the surprise question after an irrelevant task. Results indicated completing the assigned task before the surprise neither increased AA (by ending the assigned task, preventing a Zeigarnik benefit) nor decreased it (by allowing refreshing of the assigned item in memory). Therefore, the AA paradigm can be extended beyond the space between the stimulus and expected question, and this study supports the growing body of research disconfirming the Zeigarnik effect. Research supported by the Southwest Baptist University Dutile Honors Program.

A. Ireland, School of Education and Social Sciences, Missouri Valley College. **FACTORS RELATED TO PERCEPTION OF CRIMINALS.** This study investigates how perceived societal injustices, among other factors, may affect the way students view scammers and other criminals. According to prior research, increased awareness of social inequalities may cause people to see criminals through a socioeconomic filter and attribute their behavior to societal problems, a lack of opportunities, or poverty, rather than individual character or choices. It has also been established that other factors, including the race of criminal perpetrators, can impact the perceptions of those who commit crimes. Following the completion of the survey's informed consent and demographic items, students will complete the Subjective Inequality Scale (SIS; Schmalor & Heine, 2021). Then, students will read one of two scenarios about a person who engages in scam

or criminal-like activities. Both stories will have the same features, but the main character's race will be manipulated. Following the reading of these stories, participants will be asked ten questions that address critical thoughts and feelings regarding the incident and the offender. The purpose of these scenarios is to elicit responses from participants and get insight into how individuals perceive and interpret these kinds of actions and circumstances. The results of this study will help us better understand the relationships among personal characteristics, beliefs, and perceptions of individuals who commit crimes.

H. Koester and J. Elliott, Department of Psychology, College of the Ozarks. **MECHANISMS OF VARIOUS BRAIN INJURIES LITERATURE REVIEW.** There are many mechanisms of action behind brain functions. These mechanisms of action can be impacted by trauma which can cause altered brain functioning. Specifically, trauma can cause diseases such as Chronic Traumatic Encephalopathy (CTE), Traumatic Brain Injuries, and Post-Traumatic Epilepsy. This literature review will be analyzing studies related to the neurological mechanisms behind Chronic Traumatic Encephalopathy, Traumatic Brain Injuries, and Post-Traumatic Epilepsy.

J. Larimore, Department of Behavioral Sciences, College of the Ozarks. **SEXUAL DIFFERENTIATION IN THE DEVELOPMENT OF THE BRAIN AND NERVOUS SYSTEMS.** The purpose of this literature review is to explore the differences between the growth and development of the brain and the nervous system between biological males and females. The initial exploration of past research shows that males and females have different growth and developmental patterns within the brain and nervous systems. These studies also show that there are certain disorders and tendencies that are more common in a specific gender. Also, this literature review will discuss the impact of social and environmental factors attributed to the sexual differentiation of the brain and nervous systems.

E. Oyeniya Department of Political Science. Missouri State University. **WILDLIFE AND POLITICS: A COMPARATIVE STUDY OF NIGERIA AND KENYA.** Wildlife, with its incredible variety of animals, is beautiful and crucial for keeping our planet healthy. This study investigates why Nigeria struggles to capitalize on its wildlife for ecotourism, contrasting it with Kenya's success in the field. This paper comparatively looks at wildlife and ecotourism in Nigeria and Kenya, which differs from previous studies focusing on one country at a time. Both countries boast abundant wildlife resources, from the majestic elephants roaming the savannah to the colorful birdlife adorning the landscapes. This shared wealth of biodiversity provides a common ground for exploring the potential of ecotourism as an economic and environmental contributor. Kenya has become a top spot for nature lovers, while Nigeria faces challenges in turning its wildlife into a booming ecotourism industry. The paper posits that governance effectiveness, particularly in implementing wildlife protection policies, significantly influences ecotourism development. It analyzes scholarly literature, government documents, and policy reports. This paper contributes to historiography by examining wildlife and ecotourism, bridging disciplinary boundaries between political science and environmental studies. Understanding the dynamics of wildlife, politics, and ecotourism is valuable for scholars, policymakers, and conservationists striving to promote sustainable development and biodiversity conservation.

J. Senevey, A. Tabatabai, K. DeBord, Department of Social and Behavioral Sciences, Columbia College. **MUXES AND TWO-SPIRITS.** This presentation explores the similarities and differences between two groups of gender-nonconforming people: the Muxes of Latin America and the Two-Spirits of Native America. This presentation of this ethnography begins with the author's personal experiences and how they went about finding this research topic. The presentation examines the historical and cultural contexts of these groups, as well as the challenges they face from colonization, assimilation, and appropriation. The author found that Muxes and Two-Spirited people share some common features, such as being recognized as a third or alternative gender, having spiritual or ceremonial roles, and facing discrimination and violence from colonial and dominant forces. However, they also found that they differ in many aspects, such as the degree of acceptance and integration in their communities, the ways they express their gender and sexuality, and the challenges they encounter in the modern world. The author argues that these groups cannot be easily equated to modern LGBTQ+ identities, nor can they be homogenized under one label. It aims to shed light on the diversity and complexity of alternative and indigenous gender systems and to challenge the Western binary view of gender.

S. Smith, Department of Behavioral Sciences, College of the Ozarks. **NEURODEGENERATIVE DISORDERS IN RELATION TO SLEEP DISORDERS AND PREVENTATIVE MEASURES.** The understanding of rapid eye movement sleep disorder (RDM), restless legs syndrome (RLS) and various other sleep disorders can assist clinicians in identifying and treating neurodegenerative disorders at an early stage. The diagnosis of neurodegenerative disorders is notoriously challenging at an early stage of life and often can only be made after the disease has already progressed. The review and assessment of many physiological research studies pertaining to neurodegenerative disorders and sleep disorders was conducted. It is unknown how to accurately diagnose neurodegenerative disorders early to devise early prevention strategies in the field of neurodegenerative diseases and sleep disorders. This study examines whether sleep disorders may be able to help diagnose the beginning of neurodegenerative diseases, such as Alzheimer's and Parkinson's disease. Sleep disorders, such as insomnia, have been found to be negatively associated with cognitive function in older adults, resulting in the idea of using memory tests, like the Mini-Mental State Exam (MMSE), to diagnose neurodegenerative disorders. In addition to these findings, there were also markers identified genetically and biologically that can assist clinicians in making a proper diagnosis of neurodegenerative disorders. Future research should test the hypothesis that sleep disorders can be used as an early detection method to reduce the number of deaths associated with neurodegenerative disorders through effective early prevention measures.

T. Tull, and O. Janssen, Department of Human and Social Services, College of the Ozarks. **A PROPOSED STUDY ON THE IMPACT OF A PEER GROUP ON ADOLESCENT IMPULSIVITY AND AT RISK BEHAVIOR.** The proposed study would attempt to provide evidence that the impulsivity and at-risk behavior of the adolescent is correlated to their peer group. Past research revealed that adolescents have a lack of impulse control, for a variety of physiological reasons, which may lead them to taking less caution in their actions. Past research has also revealed that group mentalities and peer pressure have an impact on human behavior. This study

will also attempt to determine if the behaviors of an adolescent can be considered “at-risk” or “reckless” by definition. Our proposed study is an anonymous, self-report study, requesting answers from individuals of both sexes who are 21 years of age. There will be 50 participants. The questions will be derived from the Barratt Impulsiveness Scale (BIS-11) and adapted from Richard Walter Baptist’s “Measuring Predictors of Groupthink: Instrument Development and Validation.” Questions regarding behavior as at-risk or reckless will be derived from “Nurse ERR’s” publication. This study will provide insight for adolescents and their guardians on risk factors for impulsive behaviors and potential preventions.

A. Walker, Department of Psychological Sciences, University of Central Missouri. **THE EFFECTS OF TIME PERCEPTION ON ANXIETY IN RESEARCH ARTICLE EVALUATION.** The purpose of this research was to examine the effect of time perception on anxiety. Several previous studies have examined the relationship between time perception and anxiety (C.H. Sanford, 2023) but none assess whether anxiety levels present differently when time is presented as counting up or counting down. The goal was to test whether there was an effect on anxiety when time is visually presented in different ways while participants all complete the same task. The procedure included using the State Trait Anxiety Inventory to measure baseline anxiety before starting the study. Participants were randomized into one of three conditions where there will be visual time presented during their task. Time will either count up or count down for ten minutes or they will be in the no visual time condition. All participants read a practice research article and checked for APA format errors. The task will require more than the time allotted and anxiety will be measured again after evaluating the article to assess if anxiety increased or decreased based on the condition. Our hypothesis is that groups with time counting down will rate higher levels of anxiety than time counting up. We also hypothesize that groups in the visual time will report higher anxiety than the no time group. We will use a one way between-subjects ANOVA to analyze the data.

Poster Presentations:

M. Aguiar, School of Education and Social Sciences, Missouri Valley College. **DOES GROWING UP IN AN UNSTABLE ENVIRONMENT MAKE KIDS MORE AGGRESSIVE?** This study investigates the potential relationship between growing up in an unstable environment and increased levels of violence in children. This research is being undertaken at Missouri Valley College and will focus on students enrolled in the School of Education and Social Sciences. The study dives into the intricacies of the factors that lead to aggressive behavior, looking at the impact of several forms of instability such as familial conflict, home life, and parental influences. The study’s purpose is to focus and shed light on the complicated relationship between environmental instability and violent behavior by analyzing data from a survey distributed to Missouri Valley College Undergraduate Students. Participants will be asked to sign an informed consent form prior to participation. The study aims to contribute significant details to the present conversation regarding child development, emphasizing the need of comprehensive approaches for understanding and addressing the impact of unstable conditions on early aggression. Results are expected show that there is a correlation between growing up in an unstable environment and aggression. Although early observations point to a correlation, further inquiry and statistical data are required to draw a judgment.

C. Arnold, K. Davis, A. Zeff, and A. Dillon, Department of Psychology, Central Methodist University. **EXAMINING DIFFERENCES IN BURNOUT AMONG COLLEGE STUDENTS.** Research has shown that burnout is associated with a large number of negative consequences, including depression and anxiety (Koutsimani et al., 2019). However, most of the previous research has focused on antecedents and effects of burnout in the workforce, with less research examining burnout in college students. Research has shown that burnout is associated with decreased engagement in college students (Cazan, 2015) and more research is warranted studying who in college is most likely to suffer from burnout. In the present study, the Maslach Burnout Inventory – Student Survey was used to assess burnout late in the Fall 2023 semester and early in the Spring 2024 semester. It was hypothesized that 1. burnout would be higher at the end of the semester than during the beginning of the semester and 2. burnout would be higher among student athletes than non-student athletes. The first hypothesis was not supported; there were no significant differences in burnout between semesters. However, the second hypothesis was supported; student athletes reported significantly higher levels of emotional exhaustion, cynicism, and overall burnout than non-student athletes ($p < .05$). This research indicates that universities should be aware of how athletic participation may impact students in the classroom. Future research should continue to explore the uncertain relation between workload and burnout among college students.

R. Battini, School of Education and Social Sciences, Missouri Valley College, **SLEEP AND ACADEMIC PERFORMANCE.** The importance of sleep has been a topic that is being studied a lot especially when the subjects are students and the importance of study on their lives and grades. The purpose of this research study was to examine the influence that sleep quantity and quality has on academic performance in students, this study also shows sleep necessity in overall health. The study had one hypothesis, that is that students that get a higher quality and at least eight hours of sleep tend to have a better academic performance than those who do not and especially those who sleep less than six hours per night. A Pearson correlation was used to compare the two variables that are sleep and academic performance; resulting in a possible positive correlation. Overall, the results show that students that get more sleep tend to get better results in academics and tend to have a better health quality in general.

K. Bradley-Robinson, School of Education and Social Sciences, Missouri Valley College, **THE IMPACT OF PARENTING STYLES ON COLLEGE STUDENTS ACADEMIC ACHIEVEMENT AND MENTAL WELL-BEING.** Previous studies have disclosed potential relationships between parenting styles and emotional and educational effects. The purpose of the following study is to examine the impact that parenting style has on college student's academic achievement and mental well-being. The data was collected through a series of questions distributed through a google form to students ages eighteen to twenty-one enrolled in entry level psychology classes. For the completion of the survey participants were offered extra credit. The results of the survey were then transferred into a google sheet to be analyzed. The results of this research is expected to show that there is a correlation between parenting styles and college students' academic achievement and mental wellbeing. Impending the results, the sample size may not be reflective of the entire population.

M. Burrell, A. Larson, E. Bolling, and T. LaPonsie, Department of Psychology, Saint Louis University. **PERFORMANCE-BASED SELF-ESTEEM AND SOCIAL COMPARISON'S EFFECT ON BURNOUT IN UNDERGRADUATE STUDENTS.** College students experience a great deal of academic pressure, as students are expected to meet high standards to achieve success within higher education. These pressures appear to contribute to student burnout. Past research suggests that social comparison and performance-based self-esteem are individually related to burnout, however, such studies have failed to examine how these variables interact. Further, these factors have not been studied in the undergraduate population. To explore such interactions, undergraduate students will complete a questionnaire indicating their level of performance-based self-esteem. The study will prime students with a short passage depicting either upward or downward social comparison, followed immediately with a questionnaire to assess participants' burnout levels. Though data have not yet been collected, considering past literature, researchers predict that social comparison and performance-based self-esteem will have a significant effect on burnout, with the effects of social comparison on burnout being strongest among those with high performance-based self-esteem. Findings may allow researchers to further understand how to best address burnout in undergraduate students.

J. Dangerfield, School of Education and Social Sciences, Missouri Valley College. **SOCIOECONOMIC STATUS & SUPPLEMENTARY EDUCATION IN RELATION TO EDUCATIONAL OUTCOMES.** The aim of this study is to clarify the relationship between socioeconomic status (SES), supplementary education services (ses), and educational outcomes. The primary objective is to investigate whether SES and supplementary education services influence academic achievement, and if the effects differ for those with different economic backgrounds/statuses. Previous research suggests that students from lower socioeconomic backgrounds may face challenges in academic performance compared to their peers. Therefore, it is hypothesized that providing better academic resources could benefit students from lower SES backgrounds. This is achieved through a questionnaire comprising three sections: school SES, individual SES, and academic performance, totaling 35 questions. The methodology will involve electronic administration of the questionnaire via students' school email, accompanied by a consent form outlining the study's purpose, risks, and benefits. After approval from the Institutional Review Board (IRB), the survey will be distributed to approximately 100 undergraduate students. Ultimately, the findings are expected to support the hypothesis that students with higher socioeconomic backgrounds tend to achieve higher academic success. Additionally, it is anticipated that socioeconomically disadvantaged students may experience improved academic outcomes when provided with effective educational tools and resources.

J. Davis, Department of Art and Design, Missouri State University. **PRESERVING HISTORY AND CULTURE: 19TH-CENTURY INFANT AND CHILD GRAVESTONES.** In this Museum Studies conservation course project, I researched and identified the gravestones of three small children in the Union Campground Cemetery. Next, I researched 19th-century burial practices, and this study confirmed that the graves of infants and small children were marked very simply at this time. As was typical, at the Union Campground Cemetery the graves of Hattie Doolen, the Infant Doolen, and Jim Wresche were each marked with a footstone that was

inscribed only with the child's initials. Next, for my conservation project, I examined the graves and stones to determine the conservation needed for each of the gravesites. I first cleaned each of the gravestones. Next, I made a concrete base into which I set Hattie Doolen's broken gravestone, and I reset this over her grave. Then I straightened the Infant Doolen's tilted gravestone and supported it with gravel and fieldstones. Finally, I partially excavated Jim Wresche's gravestone, which was enveloped by a tree, and marked the gravesite with additional fieldstones.

S. Davis, Department of Psychological Science, University of Central Missouri. **MUSICAL GENRE'S IMPACT ON WORKING MEMORY.** Musical genre and its potential impact on the working memory has been a point of contention in research for a while. Some research suggests that there is an impact while others demonstrate insignificant findings (de la Mora Velasco, Chen, Hirumi, and Bai, 2023;). In the present study, participants were exposed to four conditions with different music genres and their working memory was then tested utilizing a sequence of 10 letters and numbers. Participants were students at the University of Central Missouri who are 18 years or older and signed up via the SONA Psychological Research System. The apparatus was a Samsung Galaxy A12 running the app Spotify as well as a stopwatch for the silence condition. The goal of this experiment was to assess the impact of musical genre on students' working memory. At the time of the abstract's due date, data collection is still underway. Anticipated results are that there is a significant difference between silence and the conditions that contained music with lyrical music having a more adverse effect on the recall. I will be analyzing the data with a repeated measure ANOVA.

M. Douglas, C. Holles, J. Bowen, S. Turner, L. Kempf, and S. Hernandez, S. Department of Psychology, Missouri Western State University. **SEAT-SEEKING BEHAVIOR: A PERSONALITY CHAIR-ACTER STUDY AMONG COLLEGE STUDENTS.** This research explored whether college classroom seating choices correlated with personality, anxiety, self-esteem, and social/environmental factors. Participants ($N = 122$) completed personality, anxiety, self-esteem and seat selection inventories and indicated where they normally sat in the college classroom. Results showed significant relationships between seating and social/environmental factors, but not personality, anxiety and self-esteem.

C. Genseal, P. Foreman, M. Paszkiewicz, and A. Runyan, Ph.D., Department of Psychological Science, University of Central Missouri. **NAVIGATING BIAS: DOES THE PRESENCE OF BIOLOGICAL FEEDBACK DURING IMPLICIT BIAS TRAINING IMPROVE TRAINING EFFICACY?** Previous research has indicated that implicit biases are difficult to change, and they are especially difficult to confront when individuals exhibit a strong emotional response to implicit bias intervention (Graham et al., 2022; Howell et al., 2015, 2017). This study aims to 1) determine if the completion of implicit bias training (IBT) lowers implicit racial bias and increases behavioral willingness to eliminate implicit racial bias and 2) determine whether the presence of biological feedback during IBT improves efficacy of IBT and behavioral willingness to eliminate implicit racial bias. This research is necessary because roughly 80% of American adults have an implicit bias (Sriram & Greenwald, 2009), and biases can contribute to overt behavior, a particular concern in educational settings, such as classrooms (Banks et al. 2006; Jacoby-Senghor et al., 2016). We will recruit about 40 education majors and measure their

physiological responses while each participant takes the racial Implicit Association Test (IAT). Participants will be randomly assigned to a control or biofeedback group and electrodermal activity (EDA) will be utilized as biofeedback. Participants in both conditions will complete IBT, but participants in the biofeedback condition will receive EDA as biofeedback during IBT. Participants will then complete the IAT a second time, and any differences in implicit bias between groups can be attributed to EDA biofeedback.

M. Hirst, Department of Culture & Society, Park University. **DO YOU SEE WHAT I SEE: PAREIDOLIA.** Pareidolia is the cognitive process of seeing faces or other symbols in stimuli where there is no purposeful symbol present. Examples of Pareidolia processing include seeing animals in clouds, faces in wood grain, or hidden stimuli in paintings. The main researcher of pareidolia is Susan Wardle, a researcher at the Laboratory of Brain and Cognition at the National Institute of Health. This poster will present an overview of pareidolia including its background and history, the prominent researchers in the field as well as their findings, and discuss pareidolia's applications to creativity and mental health. There is generally no universal way to test for pareidolia. In many cases, the method utilized is to show participants various images with and without illusory faces in them. Participants are then measured on the time it takes them to identify the hidden image. In one such case, that identified pareidolia as a sign of creativity, participants were shown three versions of the same image at three different contrast levels, and measured for speed in which the illusory image was identified for each constraint level. The results of this study showed that individuals who showed higher levels of creativity were able to identify the illusory faces faster than those with low creativity levels. Researching pareidolia has been a useful tool in explaining things such as creativity, general face perception and it even provides more information about schizophrenia and other neurodegenerative diseases.

D. Isernhagen, Department of Social Science, Missouri Valley College. **THE USE OF CELL-PHONES AND HOW IT AFFECTS ATHLETIC AND ACADEMIC PERFORMANCE IN A COLLEGE ENVIRONMENT.** This study investigates the impact of cell phone usage on academic and athletic performance among college students. With phones becoming a frequent technology tool in both academic and athletic environments, there is a growing concern about their influence on concentration, focus, and overall performance. Drawing from Surveys, and articles this study is exploring the relationship between cellphone use and student success. By examining the effects of cellphones on factors such as distractions, sleep disruption, and psychological well-being, this research seeks to provide insights that can inform policies and practices aimed at enhancing student achievement in college settings. The participants in this study will be undergraduate students from introduction to psychology class. The results of this research show a correlation between the phone usage and a low academic performance. There was also a correlation between cell phone use and athletic performance in a college setting. The results suggested that cell phones are not a helpful tool but a source of distraction and unhealthy habits. Results also suggested that participants who have a higher phone screen time, have a lower GPA, and lower athletic productivity than those who have lower phone screen time.

C. Marsh, School of Education and Social Sciences, Missouri Valley College. **THE RELATIONSHIP BETWEEN STUDENT-ATHLETE EXPERIENCES AND ACADEMIC PERFORMANCE.** This study will focus on the interrelation of being a student-athlete and academic performance, considering internal and external factors that may moderate that relationship. Within previous studies on this subject, there have been mixed results as there have been debates in favor of the positive effects of being a student-athlete on academic performance and there have also been studies showing negative effects. The current study is a survey-based study where 100 undergraduate students will respond to questions assessing their experience in several domains. Including demographics (5 questions), Student-athlete experiences (13 questions), Management skills (5 questions), Academic performance (11 questions), and stress/coping/health questions (12 questions). It is expected that student-athletes who score highly on positive management skills and positive coping mechanisms will have better academic performance/outcomes. The results of this study will contribute to the literature on this complex topic and may give insight into how to help student-athletes who may struggle with balancing their commitments to their sport as well as their academic experiences.

M. Martin, and P. Scott, Psychology Department, Rockhurst University. **DESCRIBING ATHLETE BURNOUT FOR IN SEASON AND OUT OF SEASON FEMALE STUDENT ATHLETES.** This study examines training levels and athletic burnout in female collegiate student athletes. Using Raedeke and Smith's (2009) Athlete Burnout Questionnaire (ABQ) 38 female student athletes who were either in season (lacrosse $n = 20$) or out of season (soccer $n = 18$) were surveyed regarding levels of training and burnout. There were significantly higher scores on the ABQ for out of season than in season athletes, $t(36) = 2.49$, $p = .018$. However self-reports of out of season training were significantly lower than in season across 3 measures, in addition to significant differences between sports. There were interactions on each training measure: days per week $F(1,36) = 41.92$, $p < .001$; hours per week, $F(1,36) = 8.15$, $p = .007$; number of different activities $F(1,36) = 7.43$, $p = .01$ such that out of season training was significantly lower for soccer. Higher levels of burnout coincide with Pacewicz, Smith and Raedeke (2020) findings that group cohesion is associated with lower levels of burnout. Future research should explore differences among sports to examine athlete experience in various settings.

S. Mathis, Department of Culture and Society, Park University. **DISRUPTIVE MOOD DYSREGULATION DISORDER: A CASE OF IRRITABILITY, ANGER, AND TEMPER IN CHILDREN.** Disruptive mood dysregulation disorder (DMDD) is a relatively new diagnosis. In 2013, DMDD was added in the DSM-5 to diagnose and explain immense feelings of irritability, anger, and tantrums in children and adolescents. Previously, professionals misdiagnosed children and adolescents experiencing these emotions with bipolar disorder. However, as these children grew and became young adults, they no longer met the criteria for bipolar which is known as a life-long disorder. This led to the new diagnosis in the DSM-5 to explain the behavior in children experiencing immense anger and outbursts in multiple contexts of their life. As children with DMDD age, their symptoms often change from immense feelings of anger, a common symptom of depression or sadness in children, to other feelings or disorders such as anxiety or major depression. I will discuss further the historical understanding, application, theoretical models, treatments, and prognosis for children and adolescents diagnosed with this disorder.

B. Miranda Guerra, K. Sherman-Wilkins, Department of Sociology, Anthropology, and Gerontology, Missouri State University. **UNDERSTANDING CANNABIS CONSUMPTION PATTERNS IN MISSOURI: AN ANALYSIS OF AN ILLEGAL MARKET IN A LEGAL STATE.** Cannabis Sativa, colloquially known as marijuana, has traversed centuries as a psychoactive substance employed medicinally, spiritually, and recreationally. The plant's oldest evidence of use dates back 2500 years, but the 20th century witnessed stringent global prohibitions. The 21st century, however, marked a reversal with Uruguay, Canada, Malta, Thailand, and individual U.S. states, including Missouri in 2023, legalizing marijuana. Despite legalization, illicit markets persist, prompting the hypotheses: bureaucratic hurdles and the more attractive prices of illegal products. Social stigmas cast a shadow, hindering adhesion to legal dispensaries due to required personal information, while the illegal market remains accessible in terms of final value. As Missouri embraces legalization, this research navigates the post-legalization landscape, focusing on cannabis acquisition sources. Employing a quantitative survey approach, it probes the dynamics of cannabis consumption, especially in terms of acquisition sources, aiming to contribute insights beyond legislative changes. The study explores socioeconomic influences on marijuana access, emphasizing financial constraints for the lower class. Methodologically, a comprehensive survey captures diverse variables, with exclusive quantitative analysis. Anticipated contributions encompass nuanced insights into post-legalization challenges, informing policies and interventions for social well-being. This research transcends a mere acknowledgment of cannabis legalization, probing into the intricacies of user behavior within a shifting acquisition landscape.

M. Newton, Department of Sociology, Anthropology and Gerontology, Missouri State University. **MAIZE-CENTRISM: ON COOKING AND CONSUMPTION IN EASTERN AND SOUTHERN PROVINCES OF ZAMBIA.** Maize is the most commonly consumed staple in Sub-Saharan Africa, where intake ranges from 52 to 450 g/person/day. Zambia has the third highest percentage of maize consumption among Sub-Saharan Africa countries, where maize provides ~60% of the country's caloric intake. This study was conducted to ascertain the methods used to prepare maize based products as well as the frequency of which maize products are consumed by primary school students in Eastern and Southern provinces of Zambia. Missouri State University students collected data by interview of 890+ primary school students, with supplemental data coming from open-air markets and household observations. Data show that 83.1% of students reported eating *nshima* (stiff maize porridge) seven days a week, and 24.3% of students reported eating maize porridge seven days a week, among a variety of other local beverages. Markets have been observed as the most common place to source all foods, including a wide variety of maize and maize products. Data suggest that better storage tactics paired with improved cooking strategies would improve provincial nutrient intake and health.

J. Palsis, Department of Education and Social Sciences, Missouri Valley College. **STUDENT DEBT AFFECTING COLLEGE STUDENTS ACADEMIC PERFORMANCE & MENTAL HEALTH.** The purpose of this study was to examine how financial problems affect college students' academic performances and mental health. Financial difficulties may be a perpetual nightmare for families, and they can play a key part in students dropping out. The need to manage part-time jobs or prioritize financial worries above academics can affect the quality of

education students receive. The fear of post-graduation financial instability, as well as the pressure to repay student loans, can have a negative impact on mental health, affecting concentration, motivation, and to be able to be fully engaged in academic studies. We hypothesized that the increase in financial stress among students will be associated with higher levels of mental health challenges and poor academic performance. The experiment took place at Missouri Valley College and used self-questionnaires to collect data. The data indicated a significant correlation between high levels of student debt and poor academic performances. Students who are struggling financially often face challenges with managing their educational expenses, leading to increased stress, lower focus, and a higher probability of poor performance.

H. Papendick, A. Wildes, N. Abusoud, I. Fricke, and K. Kiddo, Department of Psychology, Saint Louis University. **EXPLORING AUTONOMY SUPPORTIVE PARENTING AND COMMUNICATION'S IMPACT ON COLLEGE STUDENTS.** For this study, the investigation of college students with autonomy-supporting or controlling parents along with communication frequency between parent and child was conducted. Autonomy-supportive parents allow their child to be independent and self-sufficient. Conversely, controlling parents dominate decisions, adversely affecting independence. Another aspect of this dynamic is frequency of communication - an issue where there is wide variability (e.g., daily vs weekly). This study explored gaps in previous research on autonomy-supporting parenting and communication frequency between parent and child. Participants read one of four scenarios about a target student (autonomy-supporting vs controlling x low vs high communication frequency) then asked to complete an 18-question well-being scale as if they were the target. We hypothesized that targets with autonomy-supportive parents would be perceived as having higher well-being regardless of frequency of communication, whereas the target with controlling parents would be perceived as benefitting from less frequent communication with that negative parent.

K. Parrish, J. Gill, P. Tallapragada, K. Kiddoo, and I. Fricke, Department of Psychology, Saint Louis University. **EFFECTS OF PERSONAL CHARACTERISTICS ON VICTIM BLAMING.** This study aimed to investigate the impact of clothing and behavior on victim blaming in sexual assault cases. Despite the extensive research on victim blaming, little has explored the relationship between these two variables. Participants were randomly assigned to one of four vignette and photo conditions: victim clothing (provocative or conservative) and victim behavior (flirtatious or standoffish). Afterwards, participants were then asked questions to gauge their belief in a just world. We hypothesized that victims dressed provocatively and behaving in a flirtatious manner would face more blame compared to those dressed conservatively and exhibiting standoffish behavior. Finally, we predicted behavior would hold more power than the clothing, such that there would be more blame in the scenario where the victim is wearing conservative clothing, but still flirting.

A. Penn, M. Smith, Department of Psychological Sciences, University of Central Missouri. **TIME PERCEPTION AND MEDIA.** The objective of this study was to understand the effects of social media on time perception. There were two different media stimuli with two different groups each group had approximately 10 participants making approximately 20 participants in total and each got a different stimulus. One of the stimuli was the social media source TikTok.

The other got the stimulus of watching a film. Participants will be exposed to a stimulus for an equal amount of time and during the course of exposure, they were asked the question of how much time they believe has passed. The responses that they gave were then recorded. Data from the responses was determined by the difference in minutes from the actual amount of time that has passed and the amount of time they believe has passed. The hypothesized outcome for this experiment was that the group exposed to TikTok would believe that less time has passed as opposed to the group that was exposed to the movie stimulus.

F. Rodriguez Lopez, and M. Willis, Department Sociology and Anthropology, Missouri State University. **GROWTH AND MORBIDITY AMONG 6TH – 7TH GRADE STUDENTS IN EASTERN & SOUTHERN PROVINCES OF ZAMBIA.** Previous studies in sub-Saharan Africa have found evidence of stunting in children as well as correlations with infectious diseases. This study was conducted determine if these findings are agreed upon in two distinct provinces of Zambia, Africa. The study consisted of n=953 Interviews with 6-7th grade students ranging from 10-21 years of age in the Eastern Province of Chipata with 2 Primary schools and the Southern Province of Livingstone with 3 Primary schools). Data Analysis consisted of data handwritten in composition notebooks and entered in an Excel Spreadsheet; descriptive and correlational. Data results showed a significant difference ($p < 0.05$) for the height for age (HAZ) between the provinces. Results also showed no significant difference ($p > .05$) between female or male participants. Results also showed n=74 of participants were absolutely stunted ($HAZ = x < -2$) and n=602 were stunted ($HAZ = -2 < x < 0$). Of those stunted 67% reported Malaria (history), 60% reported Upper Respiratory, and 47% reported Diarrheal Disease. Of those absolutely stunted 66% reported Malaria, 84% reported Upper Respiratory, and 51% reported Diarrheal Disease. Results of stunting in these Provinces were found as well as correlations to Infectious Diseases. Supported by Benjamin A. Gilman – McCain International Scholarship, Missouri State University Board of Governors Education Abroad Award, and College of Natural and Applied Sciences at Missouri State University.

J. Rosecrans, Department Sociology and Anthropology, Missouri State University. **THE SEEDS WE SOW: FARMING AND GROWTH AMONG PRIMARY SCHOOL CHILDREN IN ZAMBIA.** Zambia's volatile economy prompted investigation in June 2023 as rural regions, where 90% of food comes from smallholder farms, became more food insecure. A joint team from Missouri State University and Zambian health universities gathered anthropometric, interview, and dental data from over 900 6th-7th graders in Eastern and Southern Provinces. Data revealed gender-based anthropometric discrepancies, demonstrating that, on average, females had higher scores than males. Additionally, primary school students with access to home gardens and farming knowledge exhibited better dietary diversity. Discrepancies may be due to differential food access, energy expenditure, higher caloric needs, and malabsorption.

S. Sampson, and K. Sherman-Wilkins, Department of Sociology Anthropology and Gerontology, Missouri State University. **MICROAGGRESSIONS, DISCRIMINATIONS, AND MENTAL HEALTH AMONG BLACK COLLEGE STUDENTS: THE ROLE OF RACE CENTRALITY IN SCHOOL CONTEXT.** Research has consistently documented the deleterious effects of stress on an individual's mental and physical health. Moreover, research has documented the

unique effects of race-related stress experienced by members of minoritized populations. Some work has documented the role that race centrality, or how central a person's race is to their sense of self, relates to how one experiences stress and, subsequently, how stress impacts their physical and mental health. In this project, we seek to add to this literature by further evaluating the relationship between race centrality, stress, and coping mechanisms between Black students at primarily white institutions versus those at historically Black colleges and universities. Using primary data collected from students at both PWIs and HBCUs, this project addresses the following research questions: What is the relationship between Black students' racial centrality and levels of self-reported stress at each institution? Does one's race centrality shape the relationship between microaggressions, discrimination, and their experience of stress?

E. Tiefenbrunn, I. Allen, M. Durham, R. Troyer, & A. C. Runyan, Ph.D., Department of Psychological Science, University of Central Missouri. **IMPLICIT BIAS TRAINING: DO PHYSIOLOGICAL RESPONSES DIFFER BETWEEN THOSE WHO HAVE AN IMPLICIT RACIAL BIAS AND THOSE WHO DO NOT?** In this study, we plan to evaluate physiological responses as participants complete the Implicit Association Test (IAT) and subsequent Implicit Bias Training (IBT). We aim to recruit around 40 upper-level undergraduate students majoring in education as participants in the current study. As participants complete IBT sessions, we aim to examine whether the physiological responses of those who have an implicit bias differ from those who do not. Through investigation of these potential differences, we aim to provide evidence that physiological responses can be used to identify and effectively confront implicit biases during IBT. Research indicates that those who endorse an implicit bias may experience a strong defensive emotional response when their biases are identified (Howell, et al., 2017), which may result in increased electrodermal activity (EDA). EDA is related to emotional and arousal responses (Kołodziej, et al., 2019) like those that may be experienced by participants and measured during IBT. As prior research also suggests those who endorse an implicit bias may experience an increase in EDA when taking the IAT and when receiving their IAT results (Nikseresht et al., 2021), we anticipate observing a significant difference in stress responses between those who endorse an implicit bias and those who do not. With the data we collect, we seek to develop more effective strategies for addressing and identifying implicit bias in future educators utilizing EDA.

K. Uphoff and B. Rodgers, Department of Sociology, Anthropology, and Gerontology, Missouri State University. **CLUBBING AT MISSOURI STATE UNIVERSITY, ANTHROPOLOGY-STYLE.** Undergraduate institutions compete to attract students based on "lived student experience." To assess the impact of the Anthropology Club on the lived experience at Missouri State University (MSU), we surveyed the current membership of 35 students, most of whom are majoring or minoring in anthropology, plus recent graduates. Results show that by hosting discipline-focused discussions (kava tasting), social events (ice cream social), demonstration activities (flintknapping), career-related forums (speakers from the Center for Archaeological Research), and an annual undergraduate research conference, the club is expanding the reach of anthropology. Other pros and cons of clubbing at MSU since 1983 are examined.

S. Valentin, B. Buttolph, R. Mink, T. Daniels, S. Yager, and C. James, Department of Psychology, Missouri Western State University. **PERSONALITY TRAITS AND EXPERIENCE OF STRESSORS DURING AND AFTER THE COVID-19 PANDEMIC.** The COVID-19 pandemic produced multiple sources of stress for many people, including social isolation, health concerns, school/job uncertainty, and restrictions on physical activity and exercise. The present study explored whether any of these stressors were experienced differently as a function of an individual's personality traits. We assessed participants' personality trait profile using the standard Big Five personality traits (Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism) and measured retroactive experience of various pandemic-related stressors across two time-frames: before the pandemic compared to during the pandemic, and during the pandemic compared to now. Consistent with previous studies conducted during the pandemic, we found significant ($p < .05$) correlations between extraversion and increased stress from social isolation, and neuroticism and increased health-related stress. Our results suggest that personality traits are a significant predictor of how the pandemic affected individuals differently, and likewise how much their different stressors have been reduced in the recovery from the pandemic. We discuss how these findings can inform potential stress-mitigation approaches that are tailored to people with different personality trait profiles.

Y. Van Cleemput, School of Education and Social Sciences, Missouri Valley College. **THE EFFECT OF MUSIC ON COLLEGE STUDENTS' CLASSROOM PERFORMANCE.** This prospective study aims to investigate the impact of music on the academic performance of college students within the classroom setting. This study is conducted at Missouri Valley College and focuses on students enrolled in courses offered by the School of Education and Social Sciences. This is an in-person experiment design, participants will be required to sign an informed consent form before engaging in the study. During this experiment, participants will be part of one of three groups: silence, classical music, or rap music. They will be tasked with completing multiple worksheets within a specific time frame. The hypothesis suggests that students listening to classical music will show a better performance because of its non-intrusive nature, potentially covering distracting noises found in the classroom environment. On the other hand, it is anticipated that rap music may negatively influence students' classroom performance. However, rap music's upbeat tempo might foster quicker task completion. This experiment showed that classical music encourages improved academic performance. The rather distracting music actually had a distracting effect on the students. However, a limitation experienced is that some students prefer distracting music because they are more frequent listeners of this type of music than others.

A. Walker and L. Schulte, Department of Psychological Science, University of Central Missouri. **WHEN WORKING MEMORY DOESN'T WORK: NEURAL DEFICITS IN INDIVIDUALS WITH ADHD.** Adults with Attention Deficit Hyperactivity Disorder (ADHD) often struggle to cope with symptoms of executive dysfunction which greatly affects working memory. New literature is suggesting that medication may not be as beneficial for executive dysfunction as it is for other symptoms of ADHD (Lenartowicz et al., 2016). To address these issues, many researchers are investigating the neural connectivity of those diagnosed with ADHD. Previous electrophysiological research shows that adults with ADHD exhibit higher alpha power than

those in control groups as well as weaker connectivity between frontal and occipital regions of the brain (Jang et. al., 2020). This information is crucial to understand how we can improve executive function and working memory in individuals with ADHD by potentially targeting and increasing neural connectivity between the frontal and occipital regions. Research also shows there is a correlation between deficits of neural connectivity and spatial working memory performance that are conceptualized as attentional issues during encoding in individuals with ADHD (Lenartowicz et al., 2016). This research may lead to the discovery of behavioral treatments that correct the aberrant connectivity present in most individuals with ADHD.

N. Weaver, Department of Sociology, Anthropology, and Gerontology, Missouri State University. **THE IMPACT OF SOCIAL MEDIA ALGORITHMS ON BLACK ARTISTS THROUGH A BLACK FEMINIST LENS.** This study seeks to (1) determine features of platform algorithms that perpetuate artist inequality and (2) start new conversations in the artistic industry referencing Collin's BFT political strategies. Black art is very influential and the blueprint for various artistic trends. While Black art is essential to the artistic field, Black artists have been victims of oppression in the creative field by injustices in pay, lack of inclusion and representation throughout history. This research extends the literature on inequalities experienced by Black artists by exploring modern forms of marginalization among Black creatives, namely through the use of social media. This study draws on existing research on discrimination through algorithms, placing it in conversation with discrepancies regarding aesthetics and algorithms. I utilize a Black Feminist approach to understand the intersectional nature of the marginalization of Black creatives and widen the sources used to discuss inequalities in the field. A focus group study will be conducted with Black artists separated by artistic talent, music, fashion, and dance that utilize Instagram, TikTok, and or Twitter/X for their artwork.