

BioUpdate

Department of Biology, Middle Tennessee State University

Spring 2024



Dennis Mullen

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Message from the chair

This past year has been busy for the faculty and students in the Department of Biology. They published 45 peer reviewed manuscripts (with 52 student co-authorships) and gave 45 presentations at regional/national conferences. Thirty-nine students (representing 10 faculty members) presented their research at this year's Scholars Week Celebration. You can see a list of presenters and winners later in this edition. Nine faculty members were awarded a total of \$4,500,000 in externally funded grants this year (accounting for nearly one-third of the total external grant funds received by the entire university in the same time period). I am extremely proud of the accomplishments of our faculty and students. This year we say goodbye to Yangseung Jeong, who took a position in January at that orange university to the east, and we welcome Cole Easson to the tenure track faculty. Cole studies marine and freshwater sponges and their microbial symbionts. He will teach courses in invertebrate zoology, microbiology, and biotechnology. We are currently searching for a Forensic Scientist to replace Yangseung. Sadly, we will say goodbye to Becky Elrod this summer. Becky is retiring at the end of June. Please see the tribute to Becky later in this edition. Be sure to check the Biology webpage (<https://mtsu.edu/biology/>) for up-to-date news and follow us on Twitter and Facebook.



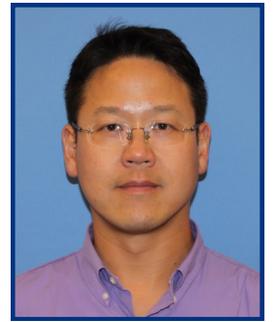
In the News...



Grant Gardner, [Department of Biology](#) professor and researcher, along with **Middle Tennessee State University** faculty **Liz Barnes**, **Sarah Bleiler-Baxter**, **Jennifer Kaplan** and **Greg Rushton**, recently landed a \$1.25 million National Science Foundation grant to develop four post-doctoral candidates into STEM-education researchers. [Read More](#)



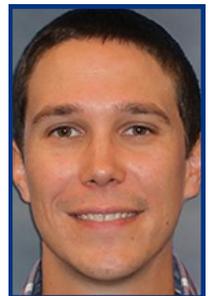
Frank Bailey, director of the [Forensic Science](#) program, and Biology professor **Yangseung Jeong** along with the **Middle Tennessee State University Office of International Affairs** hosted a contingent of law enforcement professionals from the Dubai Police Force last summer during a three-week professional exchange program. [Read More](#)



Dr. Jeong, who came to MTSU in 2017, established MOFF, MTSU Outdoor Forensic Facility, for his taphonomy research. [Read More](#)



[Department of Biology](#) assistant professors **Liz Barnes** and **Donny Walker** were each awarded \$1 million National Science Foundation grants. The awards, through NSF's Faculty Early Career Development Program also known as CAREER grants, provide funding over five years for qualifying, pre-tenured faculty. [Read More](#)



Professor **Brian Miller** teaches numerous courses in the college's Biology Department. Especially savvy about the salamanders of Tennessee, he has explored many caves, rivers, streams and creeks researching the slimy critters. [Read More](#)



Professor **Rebecca Seipelt-Thiemann** received the Career Achievement Award for Outstanding Teaching. [Read More](#)

Learn more about current research through faculty webpages—

<https://w1.mtsu.edu/biology/faculty.php>

From the lab of Liz Barnes

Exciting things happening in the Barnes lab this year! Liz received an NSF CAREER award to establish the field of undergraduate science communication education research to support undergraduate science students' abilities to communicate about culturally controversial science topics like climate change, evolution, and vaccines. She received an NSF post doc grant (with **Grant Gardner**) to bring 4 post docs to study STEM ed research; gave the plenary talk at the International Research Network for the Study of Science and Belief in Society in Exeter, England, on Religious Cultural Competence in Evolution Education; and



published 5 papers on how to improve science communication and education about evolution, climate change, and vaccines (see website- lizbarnes6.wixsite.com/spslab).

Liz's master's student, **Madison Stewart**, won a three-minute thesis award for her work on evolution understanding, acceptance, and religiosity among biology students. Her PhD students, **Rahmi Aini** and **Kate Coscia**, presented posters at the American Association for the Advancement of Science (AAAS). See write-ups from these students in this BioUpdate pages 19-21.



Recent Publications

Barnes, M. E., *Aini, R. Q., Collins, J. P., Dunk, R. D. P., Holt, E. A., Jensen, J., Klein, J. R., *Misheva, T., Nadelson, L. S., Reiss, M. J., Romine, W. L., Shtulman, A., Townley, A. L., Wiles, J. R., Zheng, Y., & Brownell, S. E. (2024). Evaluating the current state of evolution acceptance instruments: A research coordination network meeting report. *Evolution: Education and Outreach*, 17(1), 1. <https://doi.org/10.1186/s12052-024-00194-0>

*Edwards, B. A., *Bowen, C., #Brownell, S. E., & #**Barnes, M. E.**, (2024). Christian Student Experiences During Peer Interactions in Undergraduate Biology Courses. *CBE—Life Sciences Education*, 23(1), ar7. <https://doi.org/10.1187/cbe.23-01-0020>

*Bowen, C., *Summersill, A., Google, A., *Aadnes, M., & **Barnes, M.E.** (2023). Exploring Black Undergraduate Students' Communication and Biology Education Experiences about COVID-19 and COVID-19 Vaccines During the Pandemic. *CBE—Life Sciences Education*, 22(4), ar42. <https://doi.org/10.1187/cbe.22-11-0233>

Google, A., *Bowen, C., Brownell, S., & **Barnes, M. E.** (2023). Isolation, resilience, and faith: Experiences of Black Christian students in biology graduate programs. *Journal of Research in Science Teaching*. <https://doi.org/10.1002/tea.21898>

*Misheva, T., Brownell, S. E., & **Barnes, M. E.** (2023). "It's More Of A Me-Thing Than An Evolution Thing": Exploring The Validity Of Evolution Acceptance Measures Using Student Interviews. *CBE—Life Sciences Education*, 22(4), ar41. <https://doi.org/10.1187/cbe.23-01-0022>

Sonerl, P. A. G., Brownell, S. E., & **Barnes, M. E.** (2023). Analysis of Religious Bias among Christian Students in Science. *Journal for the Scientific Study of Religion*. <https://doi.org/10.1111/jssr.12825>

Biology Lab Updates

Mary and Anthony Farone Lab/Family News

Dr. Tony's PhD student Dan Bryant has graduated and accepted a postdoctoral position at Boston University with Dr. Andrew Henderson, Professor of Medicine and Virology, Immunology & Microbiology, Assistant Dean Graduate Medical Sciences, Department of Medicine and Virology, Immunology & Microbiology, where he will be working on understanding the molecular interactions of the immune response in HIV infection. Dr. Eric Vick, MD, PhD, is interviewing for medical school professorships and is expecting his first, very tall baby! Dr. Raj Ghosh continues work at Seres Therapeutics in Cambridge, Mass., and travelled back to Kolkata, India, for his wedding in December! Dr. Erin Park continues work at American Esoteric Laboratories in Memphis where her Covid workload is more manageable... but syphilis is on the rise. Dr. Nick Chamberlain (NSF GF) continues his remote work in Alaska with GenScript and hopes his fiancée will be transferred to Hawaii soon. Corbett Oullette has hurled himself into ACL surgery while continuing his PhD work at Georgia State. Brock Arivette, PhD, has taken a postdoc position at Meharry Medical College. My most recent Honors undergraduate, Shivam Patel, has been accepted to dental schools at the U. of Michigan, NYU, and UTHSc, and my current Honors student, Savannah Martin, is making good progress continuing Shivam's work with screening aureones for inhibition of virus binding.

Most importantly, Vanderbilt dietitian Grace is expecting our second grandchild, and Cate is getting married in the fall! Following graduation from Belmont Law School in May she will start a position with a law firm in Nashville while her future husband finishes his PhD program in political science at UK. Danny has started an MS program at MTSU in Accounting while continuing his data science position in Nashville, and Nicky will be graduating from Father Ryan and starting at MTSU in plant science!!!!



Biology Lab Updates

Updates from the Gardner Research Team

It has been an exciting year for the Gardner Research Team. In the summer of 2023 **Dr. Gardner** celebrated 10 years at MTSU and was promoted to professor. This honor was immediately followed in October 2023 by our group receiving two National Science Foundation (NSF) grants. The first is a 3-year, \$300,000 Education-Core Research (ECR) grant to study biology department cultures related to their implementation of graduate student teaching professional development. This Delphi study will extend the work of the Biology Teaching Assistant Project (BioTAP) and is in collaboration with co-investigators from the University of Tennessee-Knoxville, the University of Georgia, and the University of Maryland. The project also provided funding for a postdoctoral research fellow. **Dr. Eric Akuoko** joined us from the University of Iowa in January 2024 and will guide this project for the next two years.

Our team's second source of funding is a 3-year, \$1.25 million NSF STEM Education Organizational Postdoctoral Research Fellowship (OPRF) grant. This funding will support a cohort of four postdoctoral researchers with PhDs in STEM fields who wish to train as disciplinary-based education researchers (DBERs). Our PI team, which consists of five faculty active in the Mathematics and Sciences Education Research PhD program here at MTSU (**Dr. Barnes**-Biology, **Dr. Bleiler-Baxter**-Mathematics, **Dr. Kaplan**-Statistics, and **Dr. Rushton**-Chemistry), will implement a two-year immersive professional development program for this cohort while generating new data related to STEM faculty teaching professional development.



Dr. Gardner's Entomology class stops for a picture in front of the monarch butterfly mural in downtown Murfreesboro after an insect collecting field trip (Fall 2023).

Biology Lab Updates

Updates from the Gardner Research Team

Our current doctoral student **Alyssa Freeman** is completing the second year of her PhD program in Biology Education research. Alyssa has been working on numerous research projects associated with graduate student teaching professional development. She mentored two of our previous undergraduate researchers (**Chelsea Rolle, Kadence Riggs**) in obtaining URECA funding and is implementing a research study along with another undergraduate researcher (**Marco Rafat**). During the Spring 2024 semester our group presented at the regional Southeastern STEM Education Research Conference and will present at two national conferences later in the year: National Association of Research in Science Teaching and Society for the Advancement of Biology Education Research. During the Spring 2024 semester we also welcomed a cohort of three new undergraduate researchers to the team (**Abanoub Armanious, Beari Jangir, and Deborah Webb**) who are currently supporting various projects.



Ph.D. student Alyssa Freeman presents her research at the annual Society for the Advancement of Biology Education Research conference in Minneapolis, Minnesota (Summer 2023)

Biology Lab Updates

From the lab of Anthony Newsome

While Jeannie Stubblefield (now Dr. Stubblefield and clinical director for chemistry, serology, point of care testing, for Oklahoma University Health Laboratories) was at MTSU, she published several papers from our lab about the antibacterial properties of chlorine dioxide gas and its potential use in biodefense and health care applications. With the emergence of SARS-CoV-2 and the disease COVID-19, interest in viral decontamination agents came to the forefront of the public health sector. We all remember that. In response to this and in conjunction with several undergraduate research students (Newsome simply could not have done this alone) studies were directed at the potential antiviral activity of chlorine dioxide gas and its ability to decontaminate various types of surfaces. In 2023 a paper titled "Viral Disinfection of Porous Fomites Utilizing A Bacteriophage Model and Chlorine Dioxide Gas" was published (Vol. 21, No. 4) in Health Security (Mary Ann Liebert, Inc. Publishers). Here undergraduates Kendall L. Benedict and Hunter W. Brady were listed as first and second authors. The students also participated in local, national, and international presentations of this research. Fortunately, COVID-19 is now becoming a distant memory. Next time, however, perhaps we will all be better prepared and have more tools at our disposal to address a viral threat. The system used here also has the potential to disinfect disposable facemasks for reuse.

In addition, MTSU recently had an awards ceremony for long-standing employees. Although I have not been here the longest, I'm now certainly one of the more senior MTSU Biology Department faculty members. Still teaching Microbiology and Parasitology.

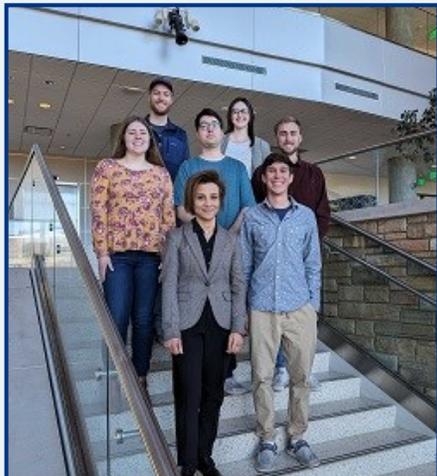


Biology Lab Updates

From the lab of Donald Walker

It has been a very busy year in the Walker Lab!

Latest publication from the Walker Lab—[Herptile gut microbiomes: a natural system to study multi-kingdom interactions between filamentous fungi and bacteria](#)

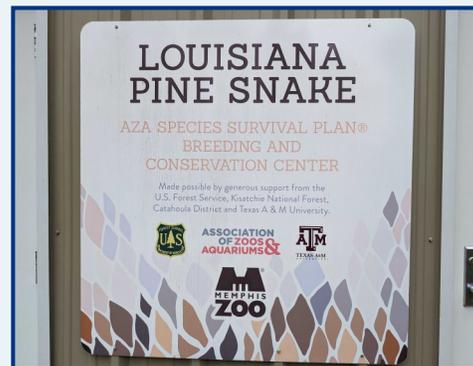


Welcome new group members –

Dr. Jason Dallas
Dr. Kaitlyn Murphy
Dr. Mitra Ghotbi
Alex Rurik
Chloe Cummins
Merrie Urban



Memphis Zoo Pinesnake headstart program



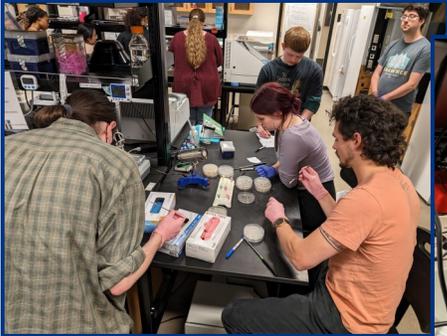
Zoo Knoxville outreach and Zoo Veterinary program



Biology Lab Updates

From the lab of Donald Walker

UMSP - Undergraduate Microbiome Scientist Program has started



Field work—Summer 2023



Motlow State Community College outreach

Biology Lab Updates

From the lab of April Weissmiller

The Weissmiller laboratory welcomes **Nikki Reed** as a new MS biology student. She will be working on investigating a novel anti-cancer therapy in the childhood cancer neuroblastoma.

Of the many undergraduates that are part of the Weissmiller lab, there are several updates of their successes this year:

James Evans completed an all-expenses paid summer internship at the University of California Los Angeles, was a co-author on a study we performed that was published in *Cancers* and is a co-author on a study currently in revision with *BMC Genomics*. In November 2023, James presented his summer work at the Annual Biomedical Conference for Minoritized Scientists (ABRCMS) in Phoenix, with funding from a competitive ABRCMS travel award he received. He is now deciding between doctoral programs that he was accepted into for Fall 2024, including the Quantitative and Chemical Biology Ph.D. program at Vanderbilt University.

Alexandria Williams completed an all-expenses paid summer internship at the University of Notre Dame, was a co-author on a study we performed that was published in *Oncogenesis* and is a co-first author on a study currently in revision with *BMC Genomics*. She is now deciding between doctoral programs that she was accepted into for Fall 2024, including programs at University of Notre Dame, the Ohio State University, and MD Anderson.

Meirola Endraws was awarded a Silver URECA grant for her work in Fall 2023 and has received additional funding to present her research at the NCUR conference, which is a national conference for undergraduate students. Meirola is now deciding between doctoral programs that she was accepted into for Fall 2024, including programs at Case Western Reserve University and University of Alabama at Birmingham.

Cole Huddleston was awarded funding to present at prestigious Posters for the Capitol and the NCUR conference, while also receiving a URECA team award in Fall 2023. Cole has been accepted into the Biomedical Sciences Masters program at Pennsylvania State College of Medicine and will begin this program in Fall 2024.

Scholars Week University-Wide Winners

1st place—Undergraduates

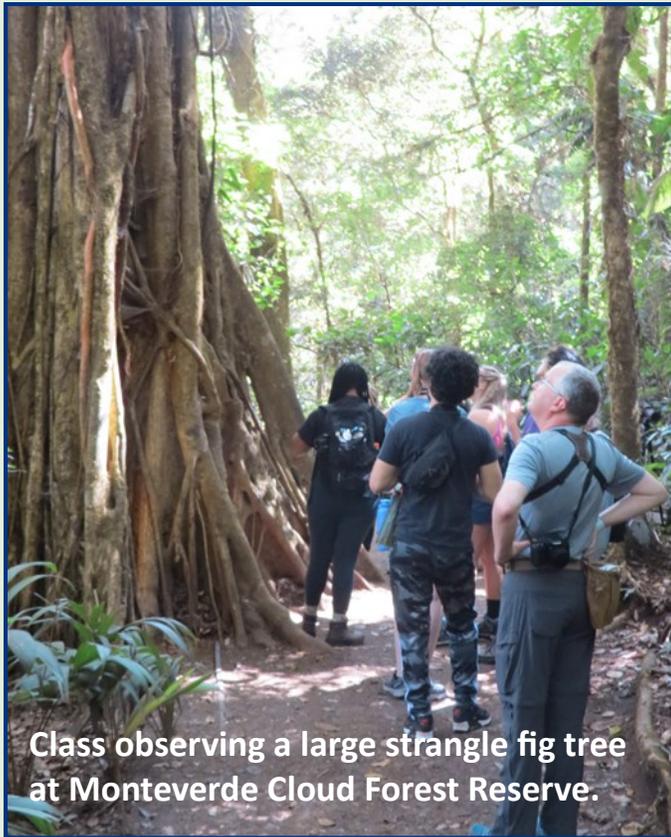


Meirola Endraws and Cole Huddleston



James Evans and Meirola Endraws

Study Abroad



Class observing a large strangle fig tree at Monteverde Cloud Forest Reserve.

One of MTSU's Signature Study Abroad Programs is BIOL 4330 "Biome Analysis: Tropical Biology in Costa Rica." Summer of 2023 was the fifth time this class has been offered. In May 2023, Drs. Vince Cobb and Jeff Walck led 11 biology undergraduate students to Costa Rica to study the biodiversity, conservation, and ecology of neotropical forests. The class spent most of the time at the internationally recognized La Selva Biological Station in northeastern Costa Rica. Only a 2.5-hour drive from San Jose, La Selva is approximately 1,600 hectares of a lowland tropical rainforest that borders Braulio Carrillo National Park. With 61 km of trails, the class only explored a small portion of the available forest. This Caribbean lowland forest is hot and humid with a species richness that is difficult to imagine (for example: 470 species of bird and 87 species of reptile). While most days, and nights, are spent hiking trails, the class did venture to a nearby cocoa farm. Students were able to taste as much

chocolate as they wanted and participated in making some chocolate from scratch (i.e., cocoa beans). Additionally, the class conducted a short research project meant to estimate the daily amount of vegetation leaf-cutter ants remove from the forest. For approximately 12 hours each day the ants form a steady stream of traffic exiting and returning to their rather large nest with leaf clippings for growing their food source, an underground fungal garden.

After a week at La Selva, we visited a high-elevation site, Monteverde Cloud Forest Reserve for a comparison of lowland and mountainous tropical forests. Although still humid, the higher elevation of the cloud



Large leaf-cutter ant mound adjacent to a trail at La Selva Biological Station.

Study Abroad

forest kept days pleasant but the nights chilly. This site is well known as a nesting location for a brilliant bird, the Resplendent Quetzal, of which the class had excellent views. The class also ventured to the continental divide where the winds and temperature reduce tree growth, creating a dwarf/elfin forest. At this site, we discussed the recent extinction of the golden toad that was restricted to only this elfin forest region of Monteverde. Although abundant in mid 1980s, the last individual was observed in 1989. After a few days, which included a visit to the mountain town of Santa Elena and

some zip lining, the class visited the dry tropical forest of Palo Verde National Park on the Pacific side of Costa Rica. The stay at Palo Verde was short (2 nights) but that seemed fine with most students as some found it a bit unnerving to share a room with scorpions. Regardless, the class saw good examples of adaptations for a dry environment (e.g., acacia trees and the stinging ants that occupy them) as well as several crocodiles during a river boat tour.



Female Great Curassow near the students' cabin.



Almost unnoticed in the vegetation, the small bright yellow in the center of this image is a hidden Eyelash Viper.



Turnip-tailed Gecko noticed on a tree trunk during a night hike.

Study Abroad

From Palo Verde, the class traveled to Playa Samara on the Pacific coast. More hiking, with excellent views of the coastline was on the agenda for our first morning with kayaking to a nearby island and snorkeling the next morning. It's difficult to not enjoy an island beach loaded with iguanas and nearby tide pools containing brittle stars and sea cucumbers.

As always, this class was a success and hopefully transformative for our young biologists. Students were exposed to a variety of habitats and were able to observe the high biodiversity of Costa Rica. With Dr. Walck leading the bird observations, a total of 235 bird species were noted and a definite record high for our class. Also, each year students find organisms not observed in previous years. Three of the many notable student observations were a silky anteater, an annulated tree boa, and a caecilian. It will be exciting to see what the students experience in 2024 as the class returns to the neotropics in mid May.



Tropical Biology class in 2023

Biology Lab Updates

Kim Sadler's News Center for Cedar Glade Studies



The 2023 Elsie Quarterman Wildflower Festival was held in collaboration with the Tennessee Native Plant Society's Annual Meeting at Cedars of Lebanon State Park. Friday evening, May 5, Todd Crabtree, a MTSU Biology alumnus and State Botanist with the Tennessee Department of Environment and Conservation, spoke about the Tennessee Rare Plants program to a crowd of more than 50. The following morning the festival was kicked off with an early morning bird-watching hike led by Dr. Jeff Walck, CCGS co-director, and Melissa Turrentine, biology alumnus. Other events for the day included a variety of natural history hikes to explore cedar glades. For example, Roger McCoy, director of the Natural Heritage Program, led a Botany by Bike trip; Sam King, TDEC Restoration Ecologist, discussed glade management with demonstrations; and Holly Taylor, TDEC state associate Naturalist, led 3-hour morning and afternoon hikes. Planting native plants talks were ongoing all day by Linda Robertson (yes, Dr. Brian Robertson's aunt), and Sharron Bracey, MTSU biology alumnus, demonstrated edible native plants (with free delicious samples). Melissa Turrentine and I, plus wonderful volunteers from our department, such as Lori Klukowski and Alex Romer, facilitated a "Round Robin" event for children for several hours with topics about trees, flowers, geology/fossils, and animals. I'm uncertain when BioUpdate will post for 2024, but just in case, the 2024 date is May 3 and 4. If you missed 2024, plan for May 2 and 3, 2025! On another note, this past semester has been an extraordinary effort on my part and my photography team to complete a booklet of 100 or so common cedar glade species with descriptions. For more information about the booklet, do not hesitate to contact me.



Lori Klukowski and Alex Romer,
"All About Glade Animals" Table



Melissa Turrentine, Friends of Cedars Volunteer,
two Children at the "All about Glade Plants" Table

Biology Lab Updates

Students in my Fall Honors BIOL 1030/31 courses have an opportunity to spend time in the cedar glades and learn more about this unique ecosystem at Flat Rock Cedar Glades and Barrens, five miles from campus. With a permit from the Department of Environment and Conservation, students collect soil samples from different sites identified as “zones” by Dr. Elsie Quarterman. The soil samples are then rudimentarily analyzed for the presence of antibiotic-producing bacteria, results are presented to their peers in a poster session. This project is part of the Tiny Earth crowd-sourcing “Search for Antibiotic-producing Bacteria” curriculum. A special thank-you to Tammy Jessen and Dr. Mary Farone for their assistance!



Sadler’s Biology 1030 Honors students sampling soil at Flat Rock



Glade Phacelia (*Phacelia dubia* var. *interior*) – Rare, Middle TN Endemic

Center for Environmental Education from Kim Cleary Sadler, Director



The year has gone by quickly as the CEE continues to offer outreach and programs to the public. The most exciting outreach has been the donation of microscopes to area schools. Microscopes no longer needed due to upgrades in our biology laboratory classes have provided the CEE with an opportunity to equip more than 15 teachers with sets of microscopes for their classrooms. An astonishing number of high school biology and environmental science classes lack equipment to teach fundamentals of the discipline, and it is so rewarding to be able to help. There are other materials available, too numerous to mention here, but if you or someone you know has a need for something related to biology, please don't hesitate to reach out.

Biology Updates

Center for Environmental Education cont.

Tennessee Amphibian Monitoring Program

Bob English has been a dedicated Director for the Tennessee Amphibian Monitoring Program (TAMP) as it celebrates its 20th year of gathering data about the frogs and toads of Tennessee. Support for the program is provided by TWRA, but these funds do not even begin to cover the tremendous amount of time and effort that Bob has put into the program.

As in previous years we conducted a workshop for the University of Tennessee in Knoxville in November of 2023. The TAMP routes that the University runs have been run continuously since Bob became TAMP state coordinator in 2004, led by Dr. Matt Gray of the Department of Wildlife and Fisheries.

We are gradually increasing the number of routes being run in West Tennessee, with several routes being run this year that had not been run in recent years. Baker's Hollow, a TAMP route in East Tennessee, is being run for the first time.

The TAMP website continues to be a valuable tool for recruiting and training new volunteers and contains everything a new volunteer needs to get started collecting data. It even includes an online TAMP workshop. The University of Tennessee in Knoxville is using this resource as a teaching tool. The TAMP website is at <https://leaps.ms/TAMP.htm>.

As in previous years, all TAMP data for the 2024 season will be entered into the GIS-based TAMP database.

The integrated database containing all TAMP data from 2004 to 2024 will be updated at the end of this sampling season. This database is designed to be used with GIS and will be incorporated into the Tennessee Wildlife Resources Agency's State Wildlife Action Plan (SWAP) for 2025.

We are happy to report that the Crawfish Frog will be included as a species deemed in need of management in the new plan based in part on the data submitted by TAMP. The SWAP plan addresses the management of Species of Greatest Conservation Need (GCN) in the state, and we are pleased to be part of this effort.

As the director of MTSU's Center for Environmental Education, I would like to express my gratitude to Bob English for his superb work in managing TAMP. He is beyond dedicated, conscientious, and just a great person to work with; we are so fortunate to have someone of his knowledge and caliber leading the charge for amphibians in the state of Tennessee.



Eastern Cricket Frog
© 2024 Robert English Leaps

BIOLOGY STUDENT TRAVEL

Biology Student Travel was established to support students invited to present their research at local and national conferences.

Ori Bergman

BS Biology Student

51st Annual Benthic Ecology Meeting

Miami, FL

April 26—29, 2023

At the end of April, I was privileged to attend the Benthic Ecology Meeting (BEM) in Miami alongside Dr. Cole Easson and his master's student, Luis Zuniga Acuna. The conference showcased research on the marine seafloor, offering careers and connections I haven't typically been able to explore in Tennessee. I presented the results of my most recent URECA project, for which I studied picoplankton (marine microbe) intake by two dominant sponge species on Florida reefs. The work was part of a collaborative project between Dr. Easson's lab and two others that have sought to understand, among other facets, temporal consistency and interspecific variation in sponge contributions to reef nutrient cycling. At this conference, I finally met our collaborators in person and learned about our group's other ongoing work.

BEM was my first conference with a large body of undergraduate researchers in attendance, and the chance to connect with other undergrads from a range of backgrounds was invaluable to me. The undergraduate focus also attracted plenty of principal investigators who were interested in discussing future graduate opportunities. My experiences at this conference helped to define my career goals and encouraged me to continue my education after I graduate.

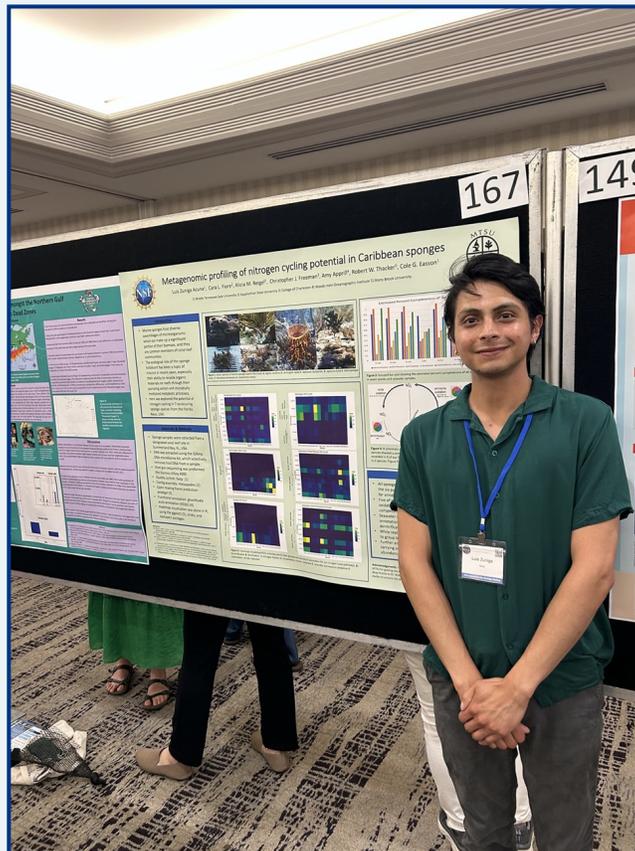


BIOLOGY STUDENT TRAVEL

Luis Zuniga

MS Biology Program
Benthic Ecology Meeting
Miami, FL
April 26—29, 2023

This April I attended the Benthic Ecology Meeting in Miami, Florida, and it was an awesome experience that reminded me there is always more to learn. The topics of conference speakers ranged from coral reef ecology to climate change impacts, and organism systems ranged from shrimp to rays. As someone who has worked in an ecological setting for 2 years my appreciation for benthic systems grew, but as a student/professional my main takeaway from this conference was on understanding how to best present a scientific story in an interesting and concise way. The speakers who provoked the most questions and thoughts in me were the ones who presented with confidence and enthusiasm, and I hope to hone that skill in my future endeavors. I had the opportunity to present a poster on my thesis research, where Dr. Easson and I used next-generation sequencing to understand how the sponge microbiome contributes to nitrogen cycling on coral reefs, which is important considering the challenges coral reefs are facing. As coral reefs continue to change, understanding how common reef residents such as sponges contribute to nutrient fluxes can help paint a clearer picture of these dynamic systems. I am grateful to have been given the chance to learn from this conference experience, and I'm thankful to Dr. Easson, Dr. Arbour, and Dr. Fiore for guiding me throughout my time in grad school on this project.



BIOLOGY STUDENT TRAVEL

Rahmi Aini

PhD Candidate, Mathematics & Science Education
Society for the Advancement of Biology Education Research
University of Minnesota-Twin Cities, Minneapolis, MN
July 20—23, 2023

I had the incredible opportunity to present my research at the SABER conference (Society for the Advancement of Biology Education Research) in July 2023 at the University of Minnesota. Collaborating with Dr. Liz Barnes, we explored the perceptions of evolution among Muslim undergraduate biology students, a topic that is currently understudied for this population in the US. Evolution is a foundational component of biology, but it often faces controversy and conflicts with religion. While previous research has focused on Christian students, our study aimed to shed light on the unique perspectives of Muslim students. We characterized different groups of students based on their acceptance of evolution, perceived conflicts with their religion, and views on creationism. Our findings revealed that Muslim students in the United States may experience similar conflicts as their Christian peers. We also identified the need to update existing frameworks and instruments to better capture the nuanced views held by Muslim students. This research holds great significance as it addresses the barriers faced by a growing minority population in learning evolution in college biology classes. Attending the SABER conference provided me with the opportunity to share our findings and engage in meaningful discussions with fellow researchers and educators. The conference not only deepened my understanding of biology education research but also emphasized the importance of promoting inclusive instructional practices and fostering understanding between religion and science. I am grateful for the enriching experience and look forward to further contributing to the field as I continue my academic journey and pursue my profession.



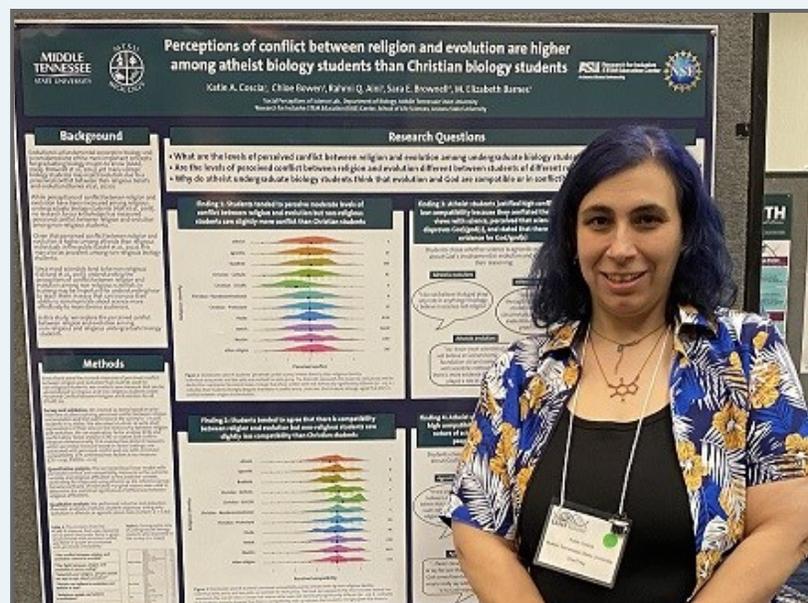
BIOLOGY STUDENT TRAVEL

Kate Coscia

PhD Candidate, Mathematics and Science Education Program
Graduate Assistant, Social Perceptions of Science Lab
Society of the Advancement of Biology Education Research
University of Minnesota-Twin Cities, Minneapolis, MN
July 20—23, 2023

In July, I traveled to the 2023 annual meeting of the Society for the Advancement of Biology Education Research (SABER) in Minneapolis with Dr. Elizabeth Barnes and other members of the Social Perceptions of Science Lab. I presented a poster on the project I've worked on with Dr. Barnes and other members of the lab since I started in the MSE PhD program, perceived conflict between religion and evolution in undergraduate biology students. This work is important since our undergraduate biology students are our next generation of scientists and science educators, so understanding their perceived conflict between religion and evolution will help improve evolution education. Presenting this work to a conference of biology education researchers really helped us disseminate our results to the biology education community and allowed us to get feedback on our work.

Attending SABER 2023 was an incredibly meaningful and productive experience for me since I'm new to biology education research, having changed fields from cell biology and physiology. SABER is one of our major conferences in the field, so it was my first introduction to the broader biology education research community. I found out how welcoming and inclusive the community is and got practice sharing my work with them. The networking was really valuable, I made connections that are going to be incredibly helpful for my professional development and future research.



BIOLOGY STUDENT TRAVEL

Madison Stewart

MS Biology Program

Society of the Advancement of Biology Education Research

University of Minnesota-Twin Cities, Minneapolis, MN

July 20—23, 2023

In July, I attended the conference for the Society of the Advancement of Biology Education Research (SABER) with the Social Perceptions of Science lab at MTSU. I presented my thesis research that explores patterns of identity-protective cognition about biology in undergraduate biology students. This research is in collaboration with the Research for Inclusive Stem Education Center at Arizona State University and my research advisor Dr. Liz Barnes. My research specifically explores to what extent undergraduate biology students' religious identities impact how well their evolution understanding predicts their evolution acceptance. It's important to understand this relationship since these students are our future healthcare professionals, teachers, and scientists, so we want to make sure we are preparing them to reason about science in a way that is as unbiased as possible. We also want to understand how to better support religious students' learning about topics that may conflict with their personal beliefs. At the SABER conference hosted by the University of Minnesota in Minneapolis, I was able to network with fellow biology education researchers who also explore teaching and communicating about controversial science topics, share the results from my research project, and get feedback from leaders in the field regarding research methods and implications.



Madison Stewart, Kate Coscia, Dr. Liz Barnes, Rhami Aini, Alexa Summersill

BIOLOGY STUDENT TRAVEL

Gracie Johnson

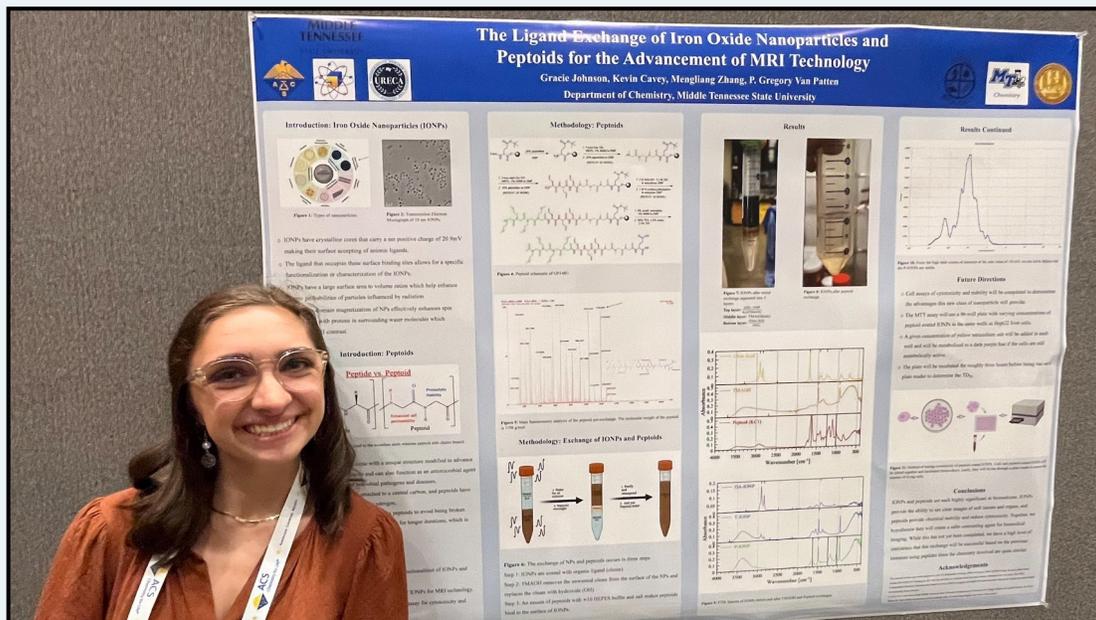
BS Biology Student

Southeastern Regional Meeting of the American Chemical Society

Durham, NC

October 25—28, 2023

As a student in research, you often hear of individuals traveling to present their work. I had never looked into this, but going to SERMACS was recommended by my mentor, so I applied with my project, The Ligand Exchange of Iron Oxide Nanoparticles and Peptoids for the Advancement of MRI Technology. This trip took place in Durham, North Carolina, which is part of the Research Triangle, and also where you can find UNC Chapel Hill and Duke University. My plan for the future is to attend one of these two schools to pursue a PhD in chemical biology, and at this conference I had the opportunity to hear current students talk about their work in nanoscience and also connect with current faculty in biology and biochemistry. Presenting my project was a 2 hour time slot, where I had many individuals stop and ask about my work and I was provided with several rational ideas of how to pursue future directions, including the opportunity for a partnership with a larger lab than my own! I feel as though this experience allowed me to grow as a student and a researcher, and I would recommend any student to participate in traveling to present! Thank you to the Biology Department and Dr. Nelson for allowing me the opportunity to go see the Research Triangle, and branch out into a new world of research!



BIOLOGY STUDENT TRAVEL

Robert C. Dixon

MS Biology Program

Society of Environmental Toxicology and Chemistry

North America 44th Annual Meeting

Louisville, KY

November 12-16, 2023

The Society of Environmental Toxicology and Chemistry (SETAC) is a great interdisciplinary conference that brings together professionals and students in biology, chemistry, and engineering. It is also an excellent place to network with professionals outside of academia. There is a strong presence of people from industry and government who are always looking for collaborators and employees as well as academics looking for grad students.

At this meeting, I presented some of my master's thesis work I conducted under Dr. Frank Bailey on statin (cholesterol-lowering drugs) toxicity in crayfish. Specifically, that the intermolt period of juvenile red swamp crayfish increased significantly with exposure to a concentration of 100 $\mu\text{g/L}$ atorvastatin. This means these levels of statins in surface waters could impact crayfish growth and reproduction, and we input drugs into streams constantly through waste-water treatment plant effluent, making this a very real potential risk to these organisms.



Robert Dixon



Dr. Frank Bailey, Jessica Landaverde,
Addison Plummer, Andrew Hetrick,
Robert Dixon

BIOLOGY STUDENT TRAVEL

Andrew Hetrick

BS Biology Student

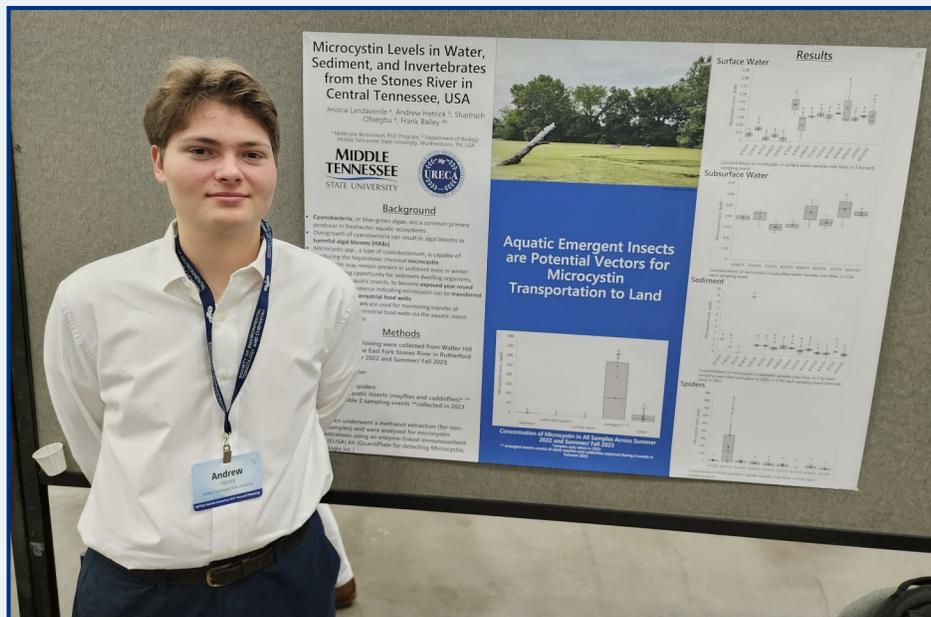
Society of Environmental Toxicology and Chemistry

North America 44th Annual Meeting

Louisville, KY

November 12-16, 2023

This past academic year I've been working under Dr. Frank Bailey and Dr. Ryan Otter in environmental toxicology research. My work with Dr. Bailey involves monitoring the concentrations of microcystin, an algal toxin that attacks liver tissue, in water, sediment, and arthropods in the Stones River. This toxin is becoming more important to study as the abundance of microcystin producing blooms increases with anthropogenic influence. My work with Dr. Otter has been in collaboration with the Health and Environmental Sciences Institute to compare global water quality criteria for three groups of pesticides and phthalates. Despite behaving the same way these compounds are regulated in completely different ways depending on the nation, so this project was designed to understand the variation present. The Society for Environmental Toxicology and Chemistry's annual meeting involves talks and poster sessions to share current research going on in the field that year. Through MTSU's Biology Department, I was able to attend and present two posters for the research I had been working on. Attending SETAC allowed me to meet and share my research with toxicologists from around the world. I was able to form connections with people that would not have been possible without attending.

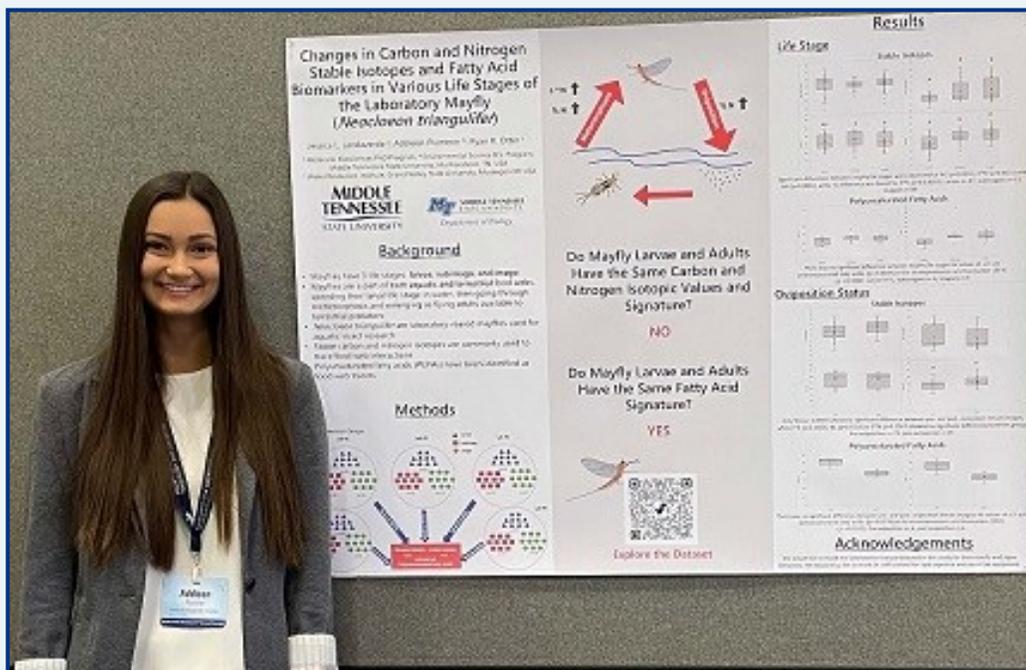


BIOLOGY STUDENT TRAVEL

Addison Plummer

BS Environmental Science, Biology minor
Society of Environmental Toxicology and Chemistry
North America 44th Annual Meeting
Louisville, KY
November 12-16, 2023

In November I attended the annual conference for the Society of Environmental Toxicology and Chemistry. At this conference I presented work that I worked on with PhD candidate Jessica Landaverde and Dr. Ryan Otter. The research was on the model organism *Neocloeon triangulifer*. This research was to help fill in the gaps about the differences in their various life stages. We looked at carbon and nitrogen stable isotopes and fatty acid biomarkers to see if there was any change in them during metamorphosis or during egg deposition. The reason why this work is important is because by understanding the differences that occur between life stages you can better understand your data and how things will change with growth in mayflies. At the conference I was able to attend a lot of different talks and poster sessions where I learned a lot about what is going on in this field of study. I was able to go to a student mentor dinner where I was able to ask different people about their career field and gain a better understanding of what a career can look like. I really enjoyed networking at this conference. I was able to meet students, professors, and researchers that helped me understand what my future can look like in this field. I also had graduate school interviews while I was there which was extremely exciting. I enjoyed everything I learned at this conference, and I thank you for allowing me to go.



BIOLOGY STUDENT TRAVEL

Aaron Gatewood

BS Biology Student

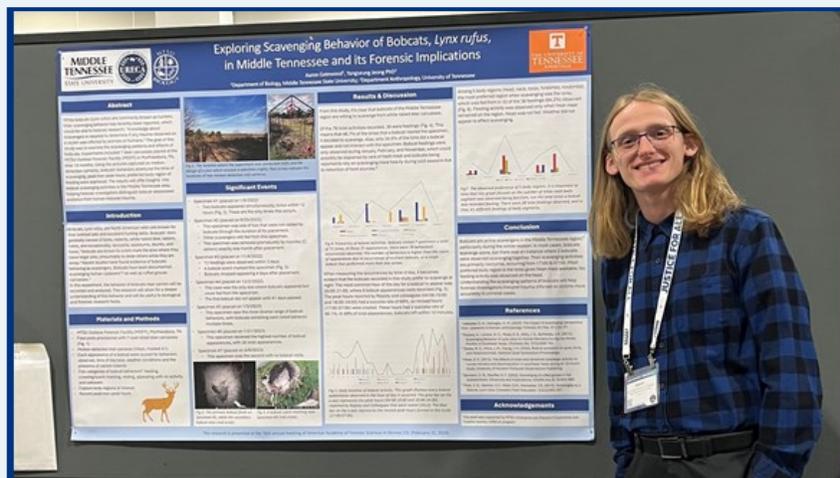
American Academy of Forensic Sciences 76th National Conference

Denver, CO

February 21-24, 2024

Hello, my name is Aaron Gatewood! From February 21-24, I traveled to Denver, Colorado, to present my Honors thesis research at the American Academy of Forensic Sciences 76th National Conference. I conducted my Honors thesis with Dr. Yangseung Jeong of the Forensics Science program, and together we studied the scavenging of deer carcasses that were laid out in the MTSU Outdoor Forensic Facility, or MOFF. While he studied all kinds of scavengers, our work together focused solely on bobcats scavenging. We had trail cameras set up around the enclosures so that any scavenging activity near the carrion could be monitored and documented. We then statistically analyzed the data to determine what kinds of activities bobcats exhibited most frequently when they were near the bodies. We found that bobcats do scavenge occasionally. In this experiment, that was actually the most common behavior, being observed in almost 50% of appearances. The bobcats recorded in this study mostly appeared between 20:00-21:00, and usually left the deer after approximately 10 minutes. This research is beneficial in both the forensic and ecological fields, as it informs of bobcat behavior when in the presence of decomposing organisms. It also elaborates on key signs of bobcat interference to a body, as opposed to possible human interference.

The conference itself was an amazing, enriching opportunity for me. I was able to meet many forensic scientists from all over the world, in many different disciplines. They had all sorts of people there, such as anthropologists, toxicologists, chemists, biologists, and criminologists. There was a wide diversity of experience to hear and learn about, and seeing that many perspectives really puts you in awe of the field itself. I didn't know much about forensics before working with Dr. Jeong, but attending this conference taught me a lot, and really showed me how interesting forensics can be. They had hundreds of workshops with people from everywhere who would come to advertise, inform, and recruit. Also, I got to meet other forensics students who studied topics close to mine right before my presentation, as I was placed next to all of the other poster presentations about scavenging animals. We all got to talk to each other about our research and had a great time throughout the presentation time itself. It wasn't even as frightening as one would expect after a few minutes. In fact, it was less intimidating than Scholars Week was by the end. I got to have some very insightful conversations, and shared my research with many. Now I can safely agree with all those others I have heard in the last four years, when they say that attending a conference is one of the best things a student can do. If you ever get the opportunity, please don't pass it up if possible, because it truly makes you a better scientist.



BIOLOGY STUDENT TRAVEL

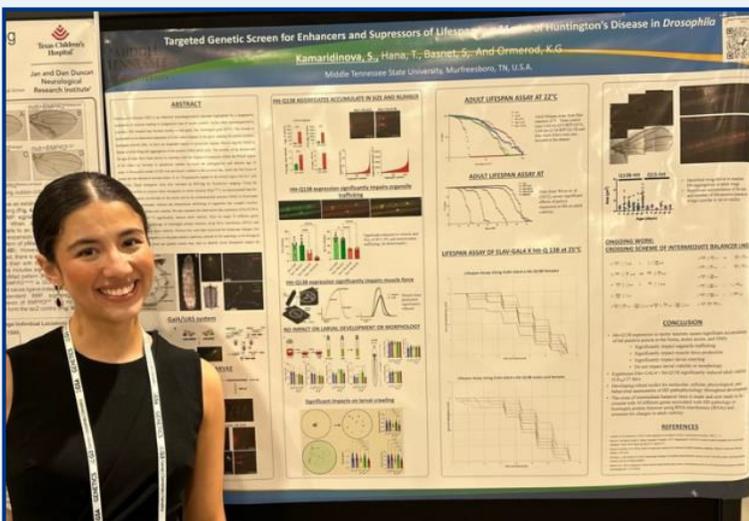
Sevinch Kamaridinova

BS Biology Student
The Allied Genetics Conference (TAGC)
Washington, DC
March 6-10, 2024

First, I want to say thank you for giving us an opportunity to attend the conference! I have learned a lot and also got a chance to visit the beautiful sights of Washington, DC.

I have presented my research at The Allied Genetics Conference in Washington. My research was focused on Targeted Genetic Screen for Enhancers and Suppressors of Lifespan in a Model of Huntington's Disease in *Drosophila*. I have worked with Dr. Kiel Ormerod, Tadros Hana, and Sabita Basnet. My research is still not fully complete, but I wanted to present what I had so far with our findings. Huntington's Disease (HD) is an inherited neurodegenerative disorder highlighted by a progressive breakdown in neurons leading to progressive loss of motor control. Unlike other neurodegenerative disorders, HD research has focused mostly on one gene, the Huntingtin gene (HTT). Here we target 50 different genes associated with HD pathology or huntingtin protein function using RNA interference (RNAi) and screened for changes in adult viability. Positive hits were then examined for molecular changes, like axonal and NMJ aggregation, to elucidate putative pathways altered in HD pathology or HTT biological function. The results from our genetic screen may help to identify novel therapeutic targets for treatments of HD.

The Allied Genetics Conference is organized by the Genetics Society of America, which brings various scientists from different research communities to share their hard work, meet new people, and learn more about different advances in the genetics and genomic community. There were a plethora of different topics, and I focused mostly on Neurogenetics, Technology, Resources and Tools, and Disease Models and Aging since these topics are focused on Dr. Ormerod's Lab. At the conference I have watched other presentations and learned a lot more different disorders such as Parkinson's disease. The benefits of attending the conference were numerous such as networking opportunities with different universities, PhD programs, graduate schools, and connecting with them to improve our research and gain more insights.



BIOLOGY STUDENT TRAVEL

Andrew Michael

BS Science Student

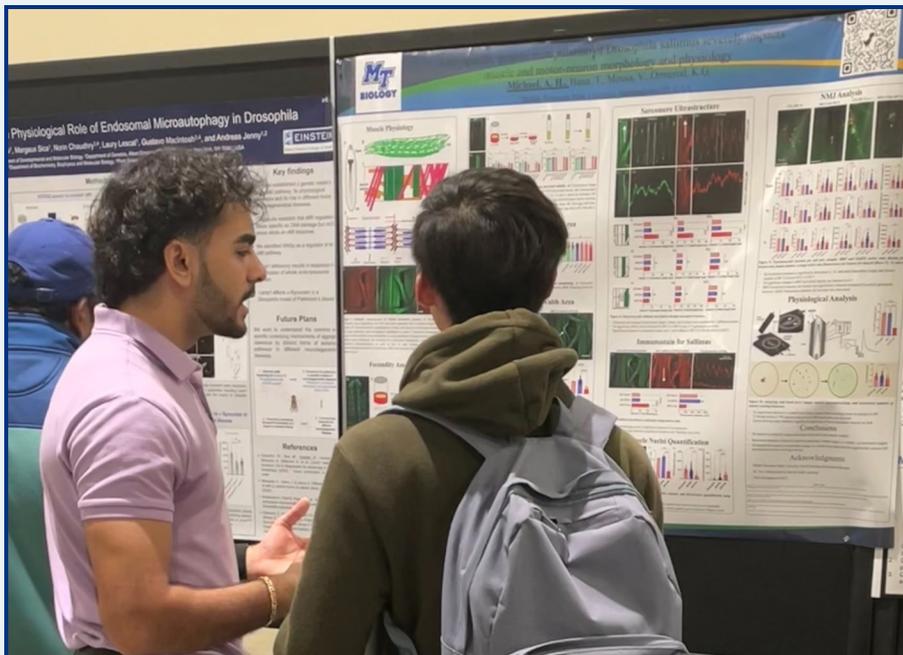
The Allied Genetics Conference

Washington, DC

March 6-10, 2024

In Washington, I presented on work done in *Drosophila melanogaster*. Specifically, I examined the excitation contraction coupling in flies and the effect of knocking down elastic proteins on the animal. Interestingly, a universal knockdown using RNAi of a particular elastic protein, Sallimus, caused lethality. Stumped, I screened through multiple single cell driver lines by crossing them with Green Fluorescent Protein (GFP) to see where the GFP was expressed. Eventually, I was able to find a fly line to express my RNAi in a single muscle fiber, avoiding lethality of the animal. From there, I examined changes in muscle length width area, sarcomere length, I-band length, and A-band length. Essentially different markers for sarcomere organization. Next, I looked at the neuromuscular junction, among other aspects of the animal. This project was done primarily by me but with the help of Veronika Moussa for behavioral work and Tadros Hana for electrophysiological recordings. This project is currently in review and brings a host of novel tools to the *Drosophila* world allowing us to study previously lethal protein knockdowns. For humans, the sallimus protein is the ortholog for the largest human protein and elastic protein Titin. Mutations in Titin, most commonly early truncations, cause multiple cardiomyopathies that are often associated with early fatality and heart failure. Now, we have an in vivo model to study the lack of elastic proteins. This conference was amazing because I got to meet a myriad of *Drosophila* biologists and network; including Dr. Troy Littleton from MIT (Dr. Ormerod's postdoc advisor). Many of my new graduate student friends also offered to send us fly lines as well as antibodies.

I want to thank Dr. Ormerod for his support and leadership in my 2 years of working with him as an undergraduate and the Biology Department for their support and funding.



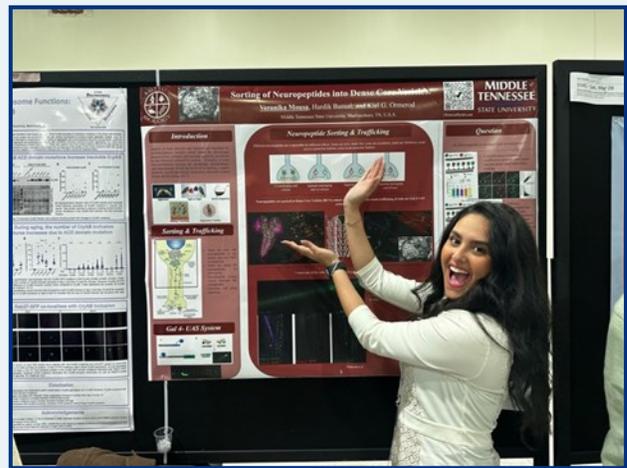
BIOLOGY STUDENT TRAVEL

Veronika Mousa

BS Biology Student
The Allied Genetics Conference (TAGC)
Washington, DC
March 6-10, 2024

For The Allied Genetics Conference 2024 in Washington, DC, I presented my research on the sorting and trafficking of dense core vesicles (DCV). I worked on this project with my colleague Hardik Bansal and mentor Kiel Ormerod. The biology of DCV sorting and trafficking can reveal copious amounts of information on how different peptides, regardless of their highly diverse nature, can sort and traffic within the same DCV or within different DCVs. Within each synaptic terminal, there are tens if not hundreds of synaptic vesicles which contain neurotransmitters, yet a much more limited number of DCVs which contain neuropeptides. This highlights the importance of this limiting factor for synaptic release. Having a better understanding of how DCVs sort and traffic can aid in the understanding of cellular communication, hormone secretion, neurotransmission, and understanding disease implications of many neurodegenerative disorders as well as endocrine disorders.

This conference provided a plethora of talks and highly experienced keynote speakers, all experts in genetics and several who use *Drosophila* as a genetic model. Having an environment of fellow scientists who use several innovative techniques on the same model organism that I study in the Ormerod laboratory provides a phenomenal opportunity to learn about advancements in the field and learn about different techniques we could potentially implement in our lab.



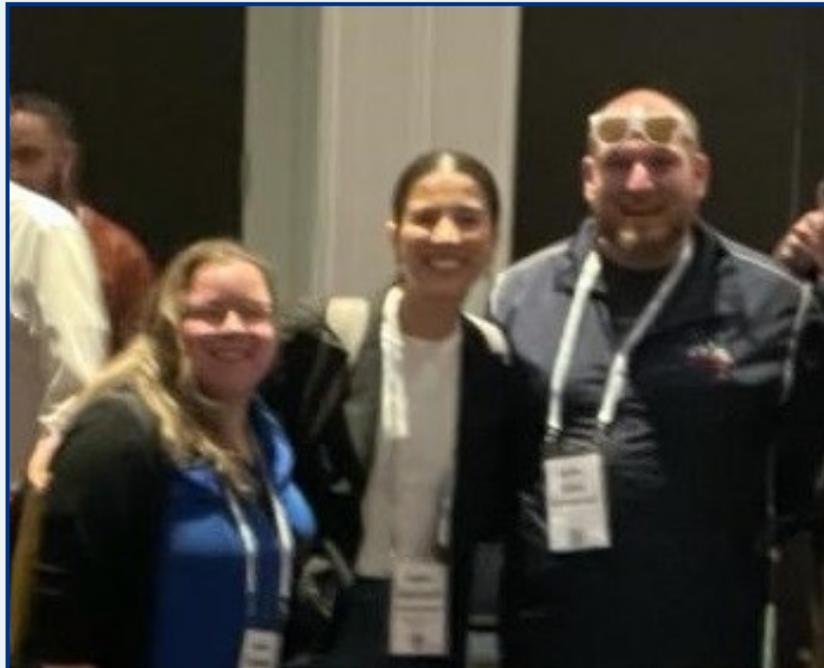
BIOLOGY STUDENT TRAVEL

Amber Washington

BS Biology Student
The Allied Genetics Conference
Washington, DC
March 6-10, 2024

The research I have been conducting and presented on is applying a mutagen, Ethyl methanesulfonate (EMS), to *Drosophila melanogaster* and identifying novel mutations that are present. I worked in Dr. Ormerod's lab to conduct this research working with him as well as a fellow lab colleague, Veronika Mousa. This research is important because it is unlike any other project in Dr. Ormerod's lab. Finding mutations from EMS are mutations that have potential to never have been seen previously.

This conference covered a variety of topics all along the lines of genetics. *Drosophila* was a genetic model most common in the list of speaking topics. This being my first scientific conference allowed me an amazing opportunity to learn about new techniques and advancements in the field of genetics and *Drosophila*.



Department Graphic Shirts and More

The department is offering shirts, backpacks, insulated lunch bags, coffee mugs, and stadium cups that sport the department graphic. The T-shirts come in short-sleeve royal blue with the Biology logo front and center. Several faculty and students have been spotted wearing the shirts. Come by and check out the merchandise in SCI 2044.

Short-Sleeve: \$15

Insulated Lunch Bag: \$8

Coffee Mugs: \$10

All items can be purchased in the department office (SCI 2044)

or by email at Biology@mtsu.edu.



Department Retirement

It is with a mixture of sadness and envy that we announce the retirement of Becky Elrod this summer. Becky has been a member of our office staff since 2008 and has served under three different chairs. Anybody who has worked with Becky in any capacity knows how friendly, reliable, and helpful she is. She is a major component of the best office staff on campus. Becky is the best friend of our graduate students. She helps us to recruit them, she helps them get settled in our department, she helps in getting them assigned to GTA positions that they are best suited for, and she is the person that they trust the most to help with any issues they have. Becky is a problem solver. Her creativity and institutional knowledge have been an enormous asset as we work to serve the needs of the students and faculty of the Department of Biology. What we will miss most are the many acts of kindness she showed us over the years, her infectious laughter that brightened everyone's day, and her amazing baked goods. We wish her a long and happy retirement and hope she will stop by occasionally to fill us in on all her new adventures.



Full-Time Temporary and Adjunct Faculty Play Major Roles

The combination of increased enrollment and decreased funding creates a challenge when it comes to assigning instructors to the ever-growing number of course sections. This need is met primarily by full-time temporary and adjunct faculty. This academic year, the department has hired full-time temporary and four adjunct faculty members.

These faculty are teaching Exploring Life lectures, General Biology II lectures, Human Anatomy and Physiology I and II labs, Comparative Anatomy of the Vertebrates labs, Genetics lectures and labs, Ecology labs, Invertebrate Zoology lecture and labs, Senior Seminar, and Biometry labs. Considering the expertise of each of these instructors, their students are obviously getting a great education. Their service to the department not only helps fill instructor roles but also helps fill in for research faculty who have received grants and/or contracts that include release time. A few of these instructors are using some of their out-of-class time to conduct their own research, often including graduate and undergraduate students. The department is forever grateful for their service.

Full-Time Temporary Faculty

Dr. Danielle Brown, B.S. 2001, Cornell University; M.S. 2006 and Ph.D. 2011, University of California — Davis. Teaching: General Biology II lecture and Human Anatomy and Physiology I and II labs

Dr. Cole Easson, B.S. 2008, University of Mississippi; Ph.D. 2013, University of Mississippi. Teaching: Exploring Life lecture, Genetics lecture and labs, Invertebrate Zoology lecture and labs, and Biometry labs

Dr. Siti Hidayati, B.S. 1986, University of Gadjah Mada; M.S. 1993 and Ph.D. 2000, University of Kentucky. Teaching: Exploring Life lecture, Ecology labs, and Senior Seminar

Dr. Amy Massengill, B.S. 1993, Stetson University; D.V.M. 1997, University of Florida. Teaching: Human Anatomy and Physiology II labs and Comparative Anatomy of the Vertebrates labs

Dr. Angelique Troelstrup, B.S. 2000, M.S. 2003, Ph.D. 2016, Middle Tennessee State University. Teaching: Exploring Life lecture and General Biology I labs

Adjunct Faculty

Andrea Y. King, B.S. 2016, Middle Tennessee State University. Teaching: Introduction to the Forensic Science Major

BioUpdate

Dennis Mullen, department chair (Dennis.Mullen@mtsu.edu)

Produced by MTSU Department of Biology

Key contributors to this issue of *BioUpdate*:

Dennis Mullen, Kim Sadler, Vincent Cobb, Lyn Powers

2023-24 Graduate Teaching Assistants

For the 2023-2024 academic year, the department is providing support to 26 M.S.- level and 7 Ph.D.- level graduate students who serve as graduate teaching assistants (GTAs). Thirteen of these students have received undergraduate degrees from colleges and universities other than MTSU. Seven hold baccalaureate degrees in subjects other than biology (agriculture, biochemistry, exercise science, forensic science, and microbiology). All have the requisite training in biology to serve as departmental teaching assistants. Without these GTAs, the department would be unable to offer the many sections of the non-majors biology course (BIOL 1030) and the majors freshman courses (BIOL 1110/1120), along with some sophomore and junior laboratories. The department is very pleased to have them.

M.S. Biology Graduate Teaching Assistants

Irene Addo, B.S., Biochemistry, 2016, Bells University of Technology

Carter Ayers, B.S., Biological Sciences, 2019, Mississippi State University

Carson Bailey, B.S., Biology, 2023, University of Tennessee Southern

Hardik Bansal, B.S., Biology, 2023, Middle Tennessee State University

Stephen Borders, B.S., Biology, 2021, Middle Tennessee State University

Tawakalit Busari, B.S., Microbiology, 2017, Fountain University

Taylor Cohen, B.S., Biology, 2022, Middle Tennessee State University

Chloe Cummins, B.S., Biology, 2022, University of Tennessee Southern

Alyssa Everhart, B.S., Biology, 2021, Middle Tennessee State University

David Gregor, B.S., Biology, 1990, Middle Tennessee State University

Tadros Hana, B.S., Biology, 2023, Middle Tennessee State University

Jonathan Jenkins, B.S., Biology, 2021, Tennessee State University

Jack Maxwell, B.S., Biology, 2021, Middle Tennessee State University

Shelby McLoda, B.S., Agriculture, 2022, Illinois State University

Parth Patel, B.S., Biology, 2023, Middle Tennessee State University

Vishwa Patel, B.S., Biology, 2022, Middle Tennessee State University

Cassandra Perrone, B.S., Forensic Science, 2022, Middle Tennessee State University

Cartiae Pounds, B.S., Biology, 2023, Middle Tennessee State University



2023-24 Graduate Teaching Assistants

M.S. Biology Graduate Teaching Assistants

Cinthia Nikki Reed, B.S., Biology, 2023, Middle Tennessee State University

Camyla Rocha, B.S., Biology, 2020, Middle Tennessee State University

Nathan Rogers, B.S., Biochemistry, 2017, Middle Tennessee State University

Alex Rurik, B.S., Biology, 2023, Westmont College

Sehad Saeed, B.S., Exercise Science, 2023, Middle Tennessee State University

Christian Zamian Sliger, B.S., Biology, 2021, Middle Tennessee State University

Matthew Jacob Stout, B.A., Biology, 2023, Carson-Newman University

Luis Zuniga Acuna, B.S., Biochemistry, 2020, Middle Tennessee State University

Ph.D. Graduate Teaching Assistants

Molecular Biosciences Program

N. Reed Alexander, B.S., Biology, 2019, Piedmont University

Joy Creighton, B.S., Biology, 2014, Georgia Southern University

Nicole Gammons, B.S., Biology, 2018, Middle Tennessee State University

Timothy Lamantia, B.S., Biology, 2017, Middle Tennessee State University; M.S., Bio-molecular Science, 2018, Lipscomb University

Michael Swaenepoel, B.S., Biology, 2017, Western Carolina University

Csilla K. Szepe, B.S., Biology, 2018, Middle Tennessee State University

Math and Science Education Program

Alyssa Freeman, B.S., Microbiology, 2019; M.S., Biology, 2022, Idaho State University

Theses and Dissertations Completed 2023-2024

Master's Theses

Summer 2023

Leigh Gardner, 2023. Just Your Friendly, Neighborhood Park Ranger: How Park Rangers can help facilitate environmental learning in the classroom, an experience with snakes
(Brian Miller, Michael Rutledge, Matthew Duncan—thesis committee)

Ashley Gereben, 2023. The Consequences of Pollination Competition on the Reproduction of *Astragalus bibullatus*
(Chris Herlihy, Jeffrey Walck, Jessica Arbour—thesis committee)

Cameron Bailey Oldham, 2023. The Effects of Caging to Prevent Herbivory on the Pollination Ecology of the Endangered Plant *Astragalus bibullatus*
(Jeffrey Walck, Chris Herlihy, and Sarah Bergemann—thesis committee)

Shannon Christine Velasquez, 2023. A Novel Method of Using Computed Tomography Data to Sort Commingled Skeletal Human Remains through Pair Matching
(Yangseung Jeong, Sarah Bergemann, Frank Bailey—thesis committee)

Fall 2023

Henry Whittemore, 2023. Sterol And Galactolipid Composition of the Lichen Photobiont Genus *Trebouxia* Compared with a Potential Host Lichen in the Genus *Usnea*
(Jeffrey D. Leblond, Donald M. Walker, Jeffrey Walck—thesis committee)

Spring 2024

Sam Johnson, 2024. CRISPR-Cas9 mediated xylose auxotrophy in *Scheffersomyces stipitis*
(J. Brian Robertson, David Nelson, Matthew Elrod-Erickson—thesis committee)

Cassandra Perrone, 2024. Determining the Effect of Residual SWI/SNF Subunits on Small Cell Carcinoma of the Ovary Hypercalcemic Type (SCCOHT) Cell Lines
(April Weissmiller, Jason Jessen, and Frank Bailey—thesis committee)

Luis Zuniga-Acuna, 2024. Metagenomic Profiling of Nitrogen Cycling Potential in Caribbean Sponges
(Cole Easson, Jessica Arbour, Cara Fiore—thesis committee)

Carl Bowman Womack, 2024. Development of a Novel Shuttle Vector for *Tetragenococcus halophilus*
(Brian Robertson, Rebecca Seipelt-Thiemann, April Weissmiller—thesis committee)

Theses and Dissertations Completed 2023-2024

Master's Theses

Spring 2024

Madison Stewart, 2024. Exploring Patterns of Evolution Understanding, Religiosity, and Evolution Acceptance in Undergraduate Biology Students in the United States
(M. Elizabeth Barnes, Grant Gardner, R. Seth Jones—thesis committee)

Stephen Borders, 2024. Invasion of Phagocytic and Non-Phagocytic Cells by '*Candidatus* Berkiella cookevillensis'

(Mary Farone, Rebecca Seipelt-Thiemann, Stephen Wright—thesis committee)

Doctoral Dissertation

Fall 2023

Daniel Bryant, 2023. Aurone-derived Triazoles as Potential Scaffolds for Fluorescent and Anti-inflammatory Molecules
(Anthony Farone, Paul Kline, David Nelson, Justin Miller, Scott Handy—dissertation committee)



Alumni News



Lexi Hamous-Miller, MS Biology, 2022, is a land use coordinator for the Northeast Region at Colorado Parks and Wildlife. She began in June 2023 after working as a technician for two months for CPW with burrowing owls.

Delaney Therrien-Gilley, MS Biology 2022, is employed as an environmental scientist II with the Tennessee Department of Environment and Conservation.



McKenna Edwards, MS Biology 2023, is employed as an instructor of Biology at Columbia State University.

Alumni News



Daniel Bryant, with Dr. Anthony Farone, at his December 2023 graduation from the Molecular Biosciences program. Dan is now a postdoctoral research fellow at Boston University School of Medicine.

Ryan Seddon (M.S. Biology, 2011): After studying hormones and leukocytes in five-lined skinks at MTSU, Ryan earned his Ph.D. in 2017 from Indiana State University in the lab of Diana Hews. His dissertation work focused on testing for interactions between color and immunity in western fence lizards, *Sceloporus occidentalis*. After Indiana, Ryan and his wife, Sarah, lived in Japan for several years while Ryan taught science classes at the University of Tokyo and Sarah worked as a writer. In 2023 Ryan accepted a position as assistant professor in the College of Veterinary Medicine at Lincoln Memorial University in Harrogate, TN (about an hour north of Knoxville). At LMU Ryan primarily teaches senior level classes for the College of Veterinary Medicine, as well as anatomy for the Doctor of Veterinary Medicine program. Still passionate about herpetology, Ryan is currently studying physiological differences between native and invasive red-eared slider turtles.



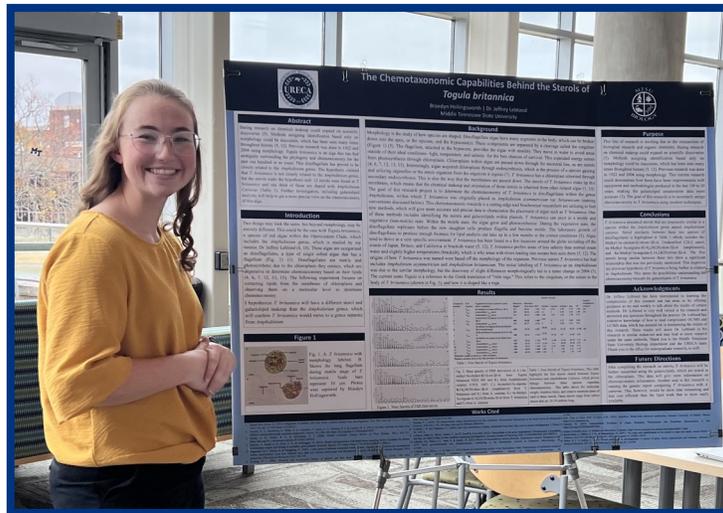
MTSU Undergraduate Research Center



The sixth annual Open House undergraduate research event, held 11/9/2023, was an informal poster session that showcased a sampling of current undergraduate student research and creative projects at MTSU. Forty-eight undergraduate researchers presented their research projects to almost 150 students and faculty in attendance. Student presenters represented the colleges of Basic and Applied Sciences, Behavioral and Health Sciences, Liberal Arts, and Media and Entertainment.

All students, particularly new students and transfer students, were invited to attend. This event was an awesome opportunity to experience the world of undergraduate research – learn more about the different projects that students pursue, ask questions about how they became involved in undergraduate research, meet some current faculty mentors, find out details about the spring and summer URECA grants, and learn about SOAR, the student organization devoted to undergraduate research.

The 2023 Fall Research Open House



Braedyn Hollingsworth, Biology minor; **Dr. Jeff Leblond** (faculty sponsor), Biology; “The Chemotaxonomic Capabilities Behind the Sterols and Galactolipids of *Togula britannica*”

Additional poster presentations:

Madonna Aziz, Biology; **Dr. Kiel Ormerod** (faculty sponsor), Biology; “Pharmacologically targeting the proliferation of protein aggregates in a model of Huntington’s Disease in *Drosophila*”

Stephen Clifford, Biology; **Dr. Kiel Ormerod** (faculty sponsor), Biology; “Do Deficits in Key Motor Proteins Impact Muscle Physiology and Highly Stereotyped Rhythmic Behavior?”

Tadros Hana, Biology; **Dr. Kiel Ormerod** (faculty sponsor), Biology; “Conducting a genetic screen to identify novel enhancers and suppressors of Huntington’s Disease pathogenicity using GWAS acquired target”

Andrew Michael, Science; **Dr. Kiel Ormerod** (faculty sponsor), Biology; “Uncovering Components of the Excitation-Contraction Coupling Machinery Using a Cell-Specific Approach in *Drosophila melanogaster*”

Scholars Week Highlights Faculty and Student Research

Scholars Week March 11-15, 2024

Middle Tennessee State University held the 18th Annual Scholars Week March 11-15, 2024.

Scholars Week is a weeklong tradition during which MTSU's academic colleges celebrate scholarship, research, and creative activity through a variety of events and activities. The department presented 28 posters at the CBAS poster day in the SCI atrium and 29 at the university-wide poster session. Authors of these posters included 11 faculty members, 8 graduate students, and 39 undergraduate students. Faculty members involved in mentoring these students deserve credit for their time, effort and expertise in these research projects. Many people from across campus saw the quality of research being conducted in the department.

Congratulations to all authors for a job well done!

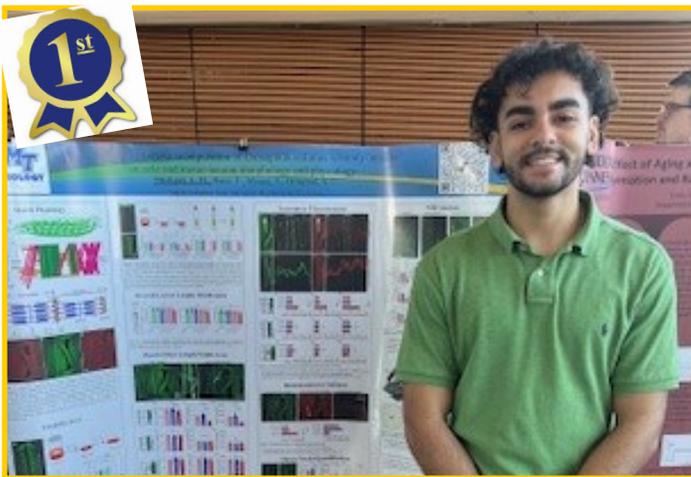
To see the Scholars Week program, visit <https://www.mtsu.edu/scholarsweek/index.php>

The following are posters from the Department of Biology.

Congratulations to the CBAS 2024 Poster Day Competition authors and their faculty mentors!

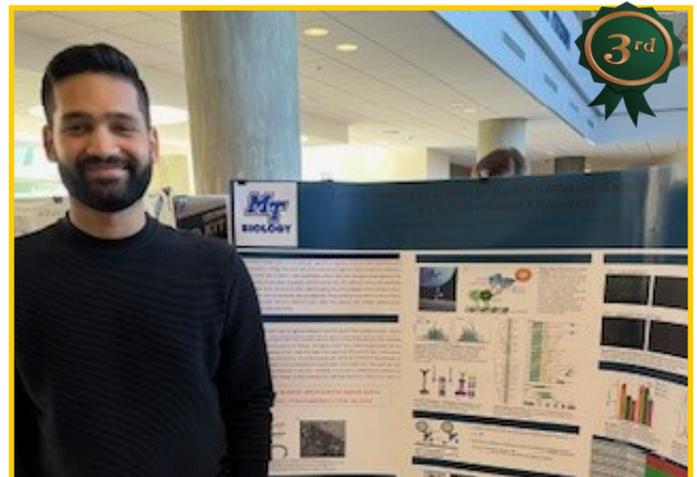
CBAS 2024 Poster Day Competition

BS PROGRAM



Andrew Michael, BS Science; **Dr. Kiel Ormerod** (faculty mentor), Biology; "Cell-Specific Genetic Manipulation of *Drosophila Sallimus* Severely Impacts Muscle and Motor-Neuron Morphology and Physiology"

MS PROGRAM



Hardik Bansal, MS Biology; **Dr. Kiel Ormerod** (faculty mentor), Biology; "Motor Neurons Require Specialized Proteins for Intracellular Trafficking of Neuropeptides in *Drosophila Melanogaster*"

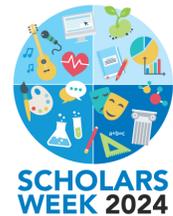


Scholars Week Highlights Faculty and Student Research

Scholars Week March 11-15, 2024

Congratulations to the CBAS 2024 Poster Day Competition authors and their faculty mentors!

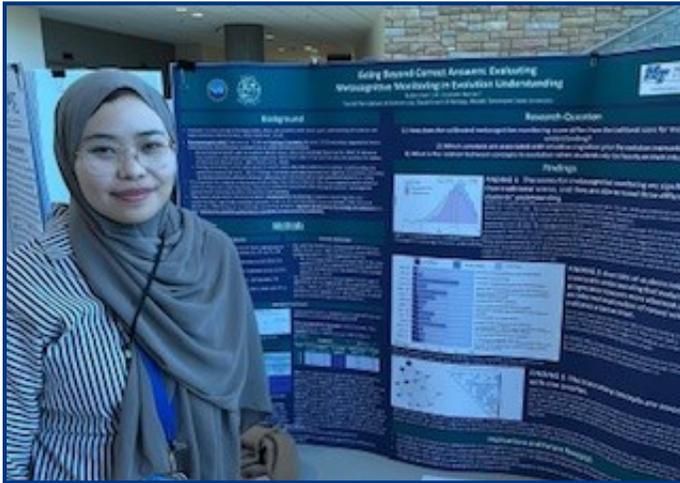
PHD PROGRAM



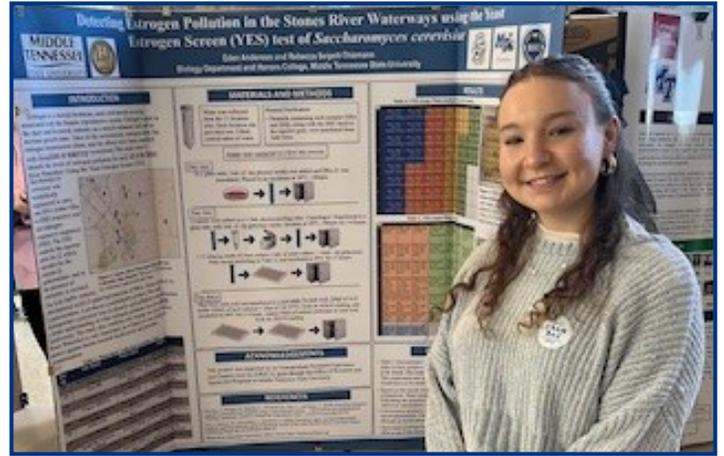
Heather Green, PhD MSE-BioEd; **Andrea Reeder**, PhD MSE-ISED; **Dr. Joshua W. Reid**; **Herman E. Ray**; **Dr. Greg Rushton** (faculty mentor), TSEC; "Analysis of Performances on the Praxis Biology Content Knowledge Test at the Category Level"



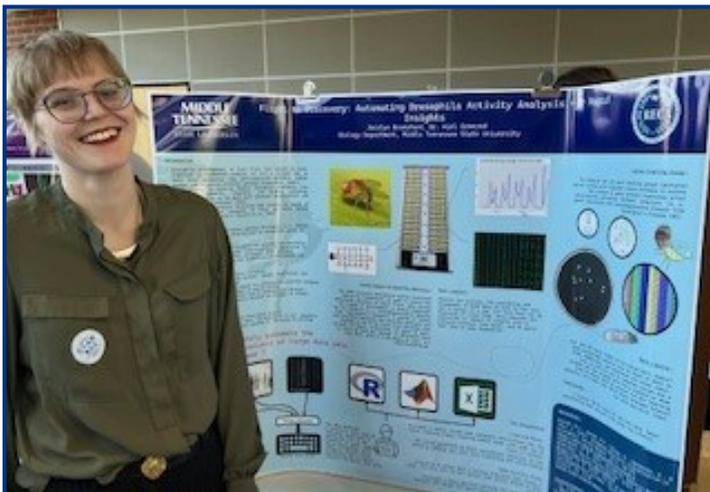
Scholars Week - CBAS Poster Day March 12, 2024



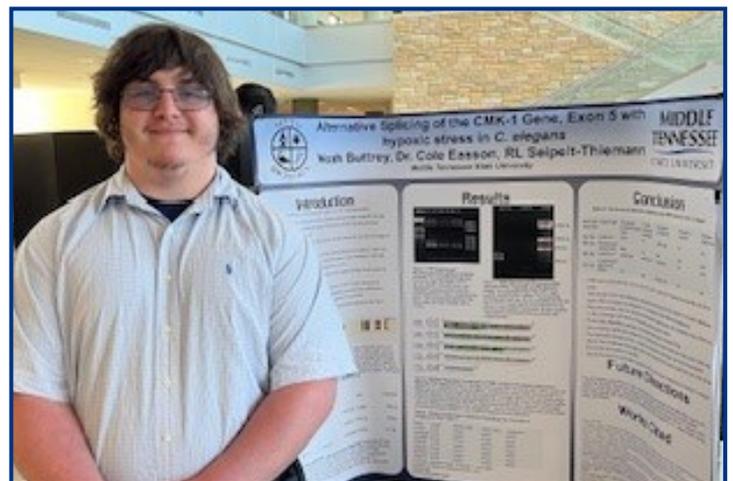
Rahmi Aini, PhD MSE-BioEd; **Dr. Elizabeth Barnes** (faculty mentor), Biology; "Going Beyond Correct Answers: Evaluating Metacognitive Monitoring in Evolution Understanding"



Eden Anderson, BS Biochemistry; **Dr. Rebecca Seipelt-Thiemann** (faculty mentor), Biology; "Detecting Estrogen Pollution in the Stones River Waterways Using the Yeast Estrogen Screen (YES) Test of *Saccharomyces cerevisiae*"



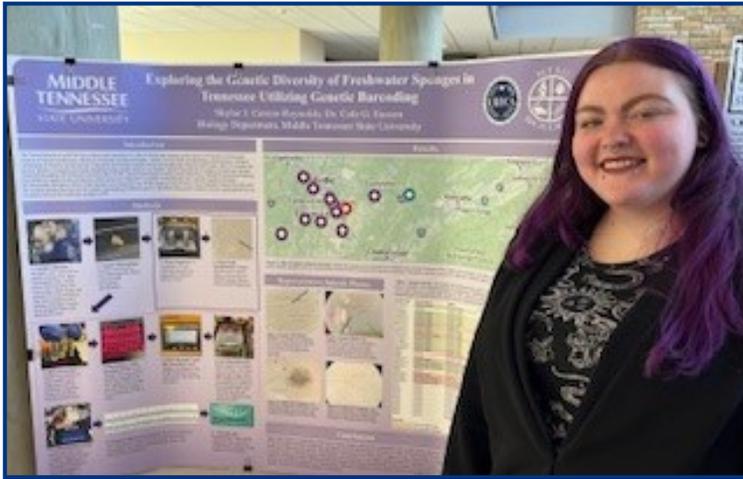
Jocelyn Bransford, BS Biology; **Dr. Kiel Ormerod** (faculty mentor), Biology; "Flight to Discovery: Automating Drosophila Activity Analysis for Rapid Insights"



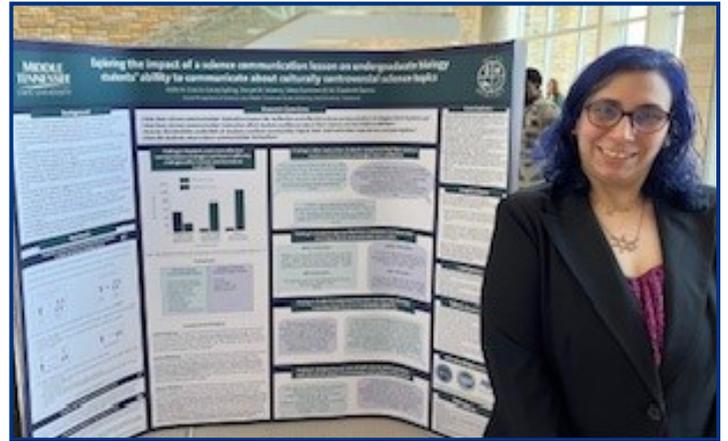
Noah Buttrey, BS Biology; **Dr. Rebecca Seipelt-Thiemann** (faculty mentor), Biology; "Alternative Splicing of the CMK-1 Gene, Exon 5 With Hypoxic Stress in *C. Elegans*"



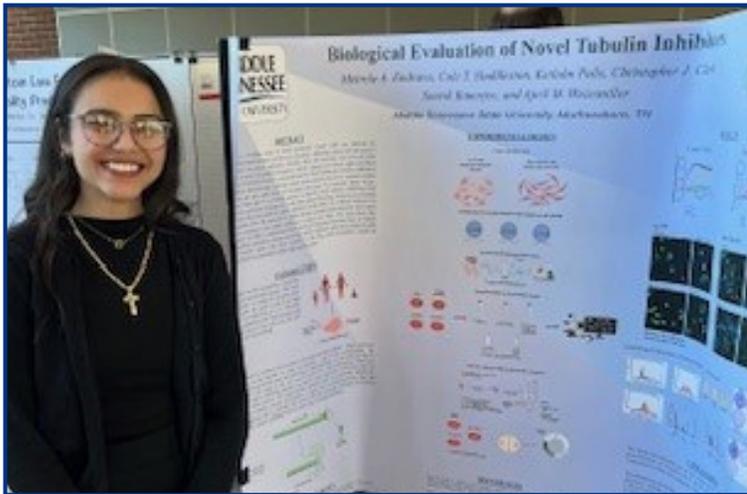
Scholars Week - CBAS Poster Day March 12, 2024



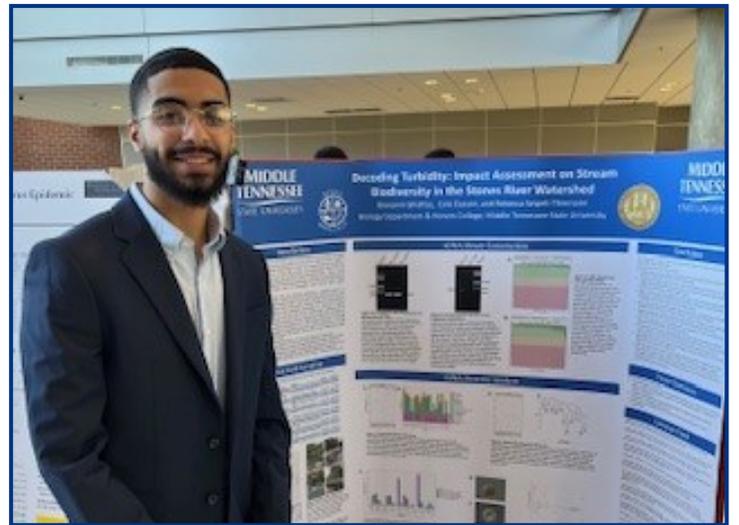
Skylar Carson-Reynolds, BS Biology; **Dr. Cole Easson** (faculty mentor), Biology; "Exploring the Genetic Diversity of Freshwater Sponges in Tennessee Utilizing Genetic Barcoding"



Kate Coscia, PhD MSE-BioEd; Casey Epting, BS Biochemistry; Donye Asberry, BS Biochemistry; Alexa Summersill, BS Psychology; **Dr. Elizabeth Barnes** (faculty mentor), Biology; "Exploring the Impact of a Science Communication Lesson on Undergraduate Biology Students' Ability to Communicate About Culturally Controversial Science Topics"



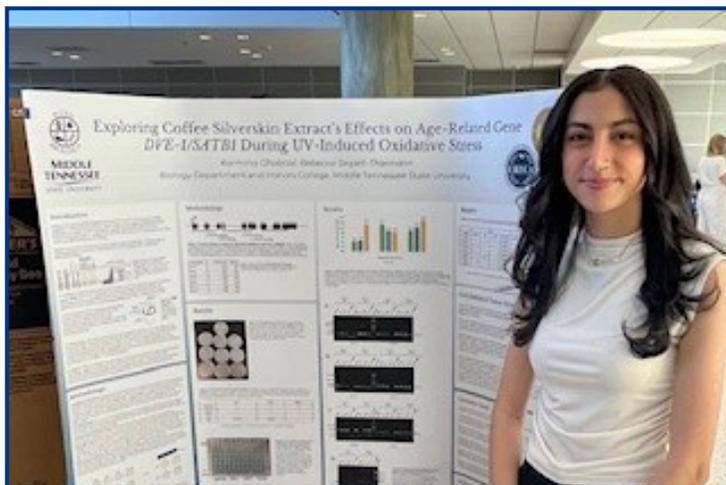
Meirola Endraws, BS Biochemistry; Cole Huddleston, BS Biology; Christopher Clark, PhD MOBI; Dr. Souvik Banerjee, Chemistry; **Dr. April Weissmiller** (faculty mentor), Biology; "Biological Evaluation of Novel Tubulin Inhibitors"



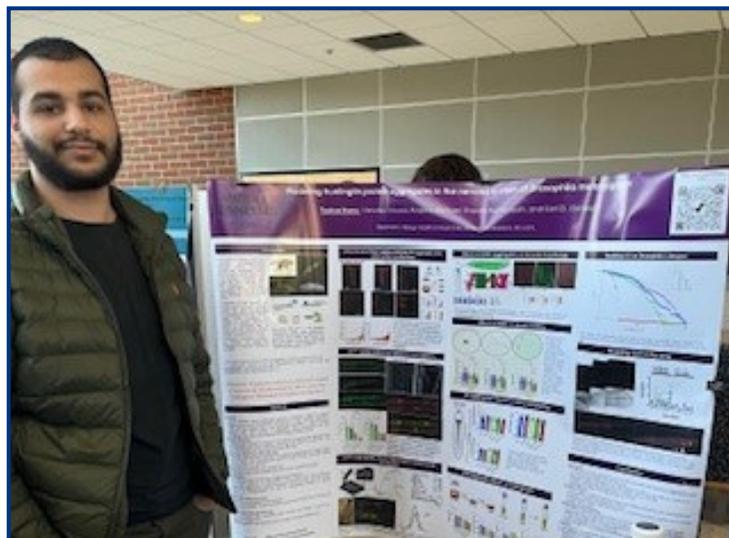
Giovanni Ghattas, BS Biochemistry; Dr. Cole Easson, Biology; **Dr. Rebecca Seipelt-Thiemann** (faculty mentor), Biology; "Decoding Turbidity: Impact Assessment on Stream Biodiversity in the Stones River Watershed"



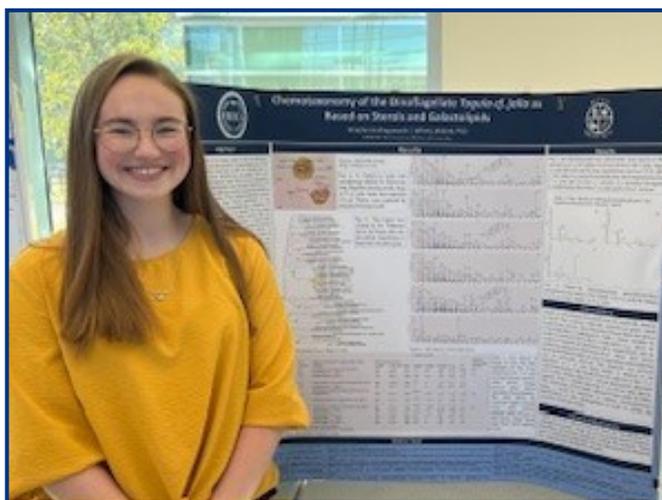
Scholars Week - CBAS Poster Day March 12, 2024



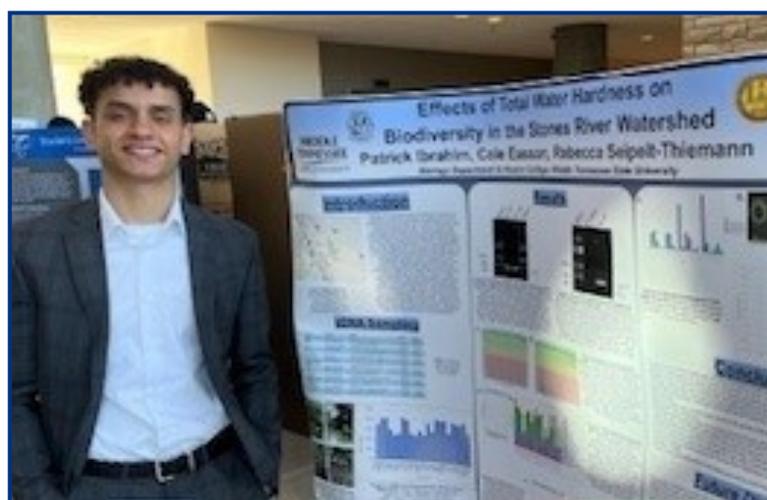
Karmina Ghobrial, BS Biology; Dr. Rebecca Seipelt-Thiemann (faculty mentor), Biology; "Exploring Coffee Silverskin Extract's Effects on Age-Related Gene DVE-1/SATB1 During UV-Induced Oxidative Stress"



Tadros Hana, MS Biology; Dr. Kiel Ormerod (faculty mentor), Biology; "Examining the Electrophysiological Impacts of Huntington's Disease at the Drosophila Neuromuscular Junction"



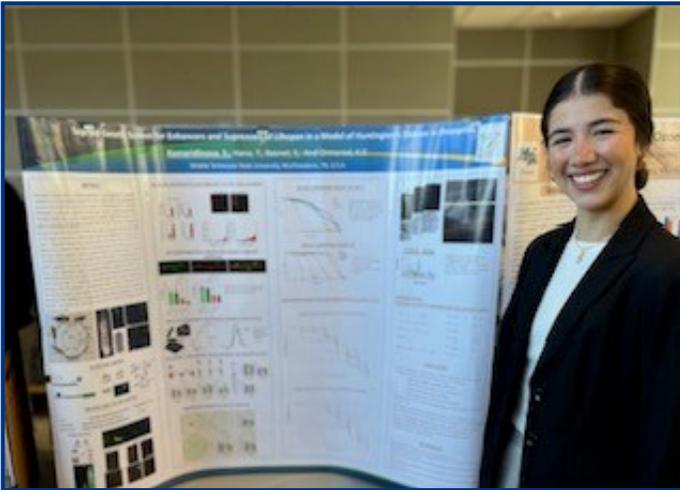
Braedyn Hollingsworth, BS Chemistry; Dr. Jeff Leblond (faculty mentor), Biology; "Chemotaxonomy of the Dinoflagellate Togula Britannica as Based on Sterols and Galactolipids"



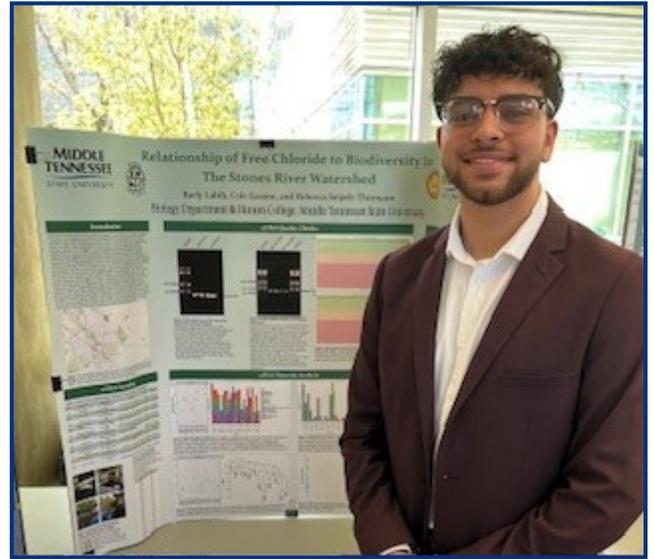
Patrick Ibrahim, BS Biology; Dr. Cole Easson, Biology; Dr. Rebecca Seipelt-Thiemann (faculty mentor), Biology; "Effects of Total Water Hardness on Biodiversity in the Stones River Watershed"



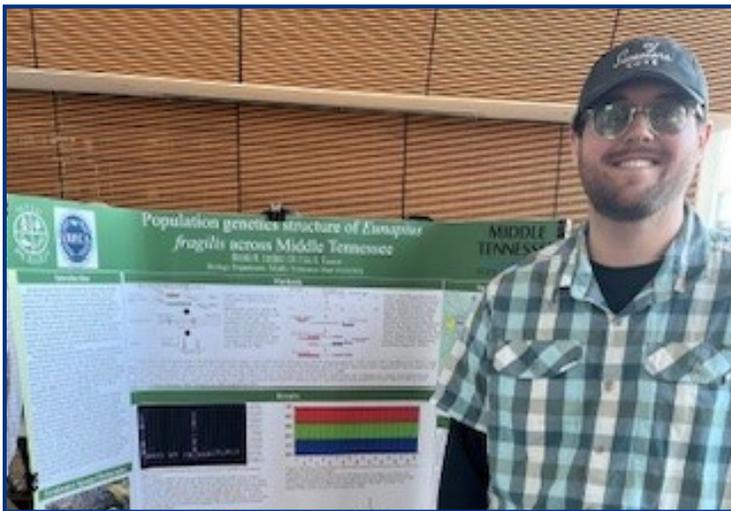
Scholars Week - CBAS Poster Day March 12, 2024



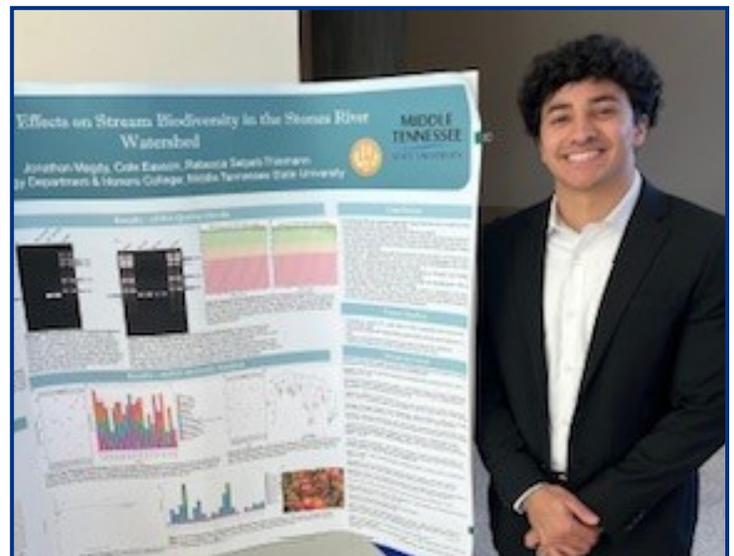
Sevinch Kamaridinova, BS Biology; **Dr. Kiel Ormerod** (faculty mentor), Biology; "Targeted RNA Interference Screen to Identify Novel Modifiers of Huntington's Disease Impact on Adult Viability in *Drosophila*"



Bavly Labib, BS Biology; **Dr. Cole Eason**, Biology; **Dr. Rebecca Seipelt-Thiemann** (faculty mentor), Biology; "Relationship of Free Chloride to Biodiversity in the Stones River Watershed"



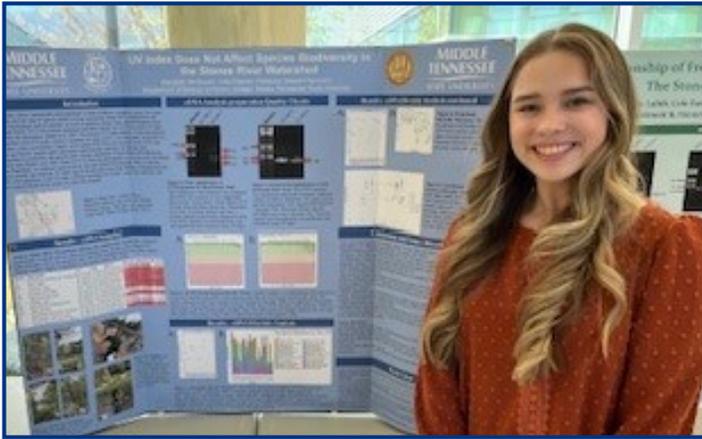
Brooks Leyhew, BS Biology; **Dr. Cole Eason** (faculty mentor), Biology; "Population Genetics Structure of *Eunapius fragilis* Across Middle Tennessee"



Jonathan Magdy, BS Biology; **Dr. Cole Eason**, Biology; **Dr. Rebecca Seipelt-Thiemann** (faculty mentor), Biology; "Phosphorus Effects on Stream Biodiversity in the Stones River Watershed"



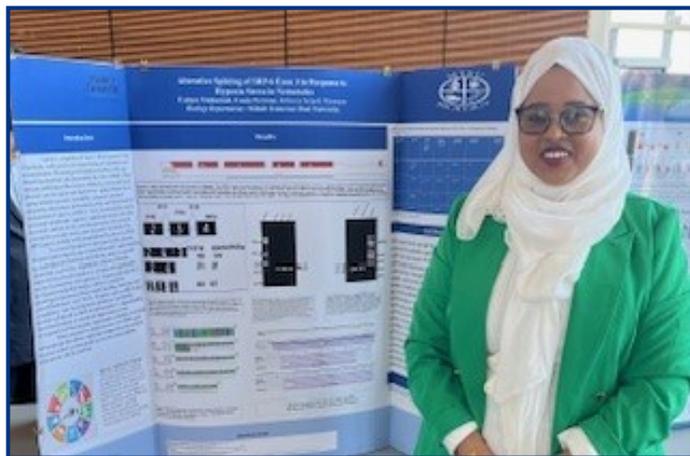
Scholars Week - CBAS Poster Day March 12, 2024



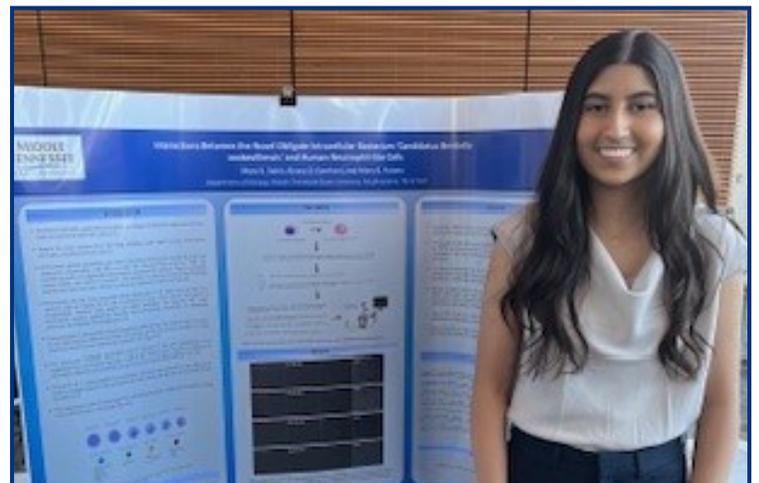
Elizabeth McQueen, BS Biology; Jacqueline Williams, BS Biology; Dr. Cole Easson, Biology; **Dr. Rebecca Seipelt-Thiemann** (faculty mentor), Biology; "Ultraviolet Levels Does Not Correlate with Species Biodiversity in the Stones River Watershed"



Veronika Mousa, BS Biology; **Dr. Kiel Ormerod** (faculty mentor), Biology; "Sorting of Neuropeptides into Dense Core Vesicles"



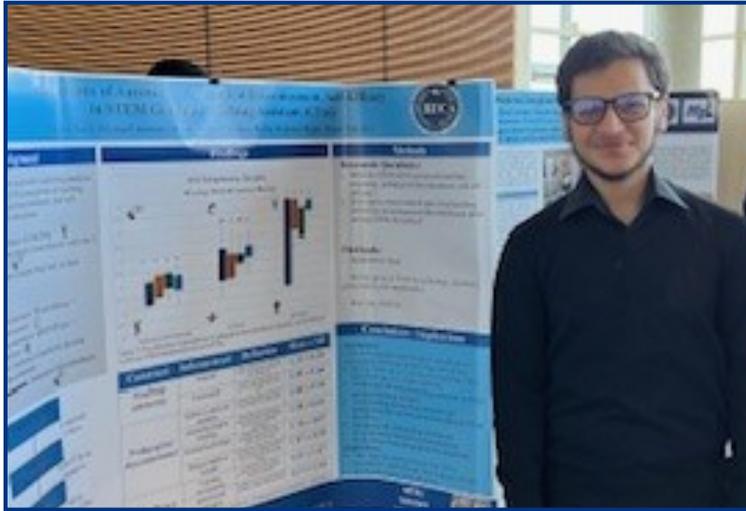
Fadumo Muhumad, BS Biology; Cassandra Perrone, MS Biology; **Dr. Rebecca Seipelt-Thiemann** (faculty mentor), Biology; "Alternative Splicing of SRP-6 Exon 3 in Response to Hypoxia Stress in Nematodes"



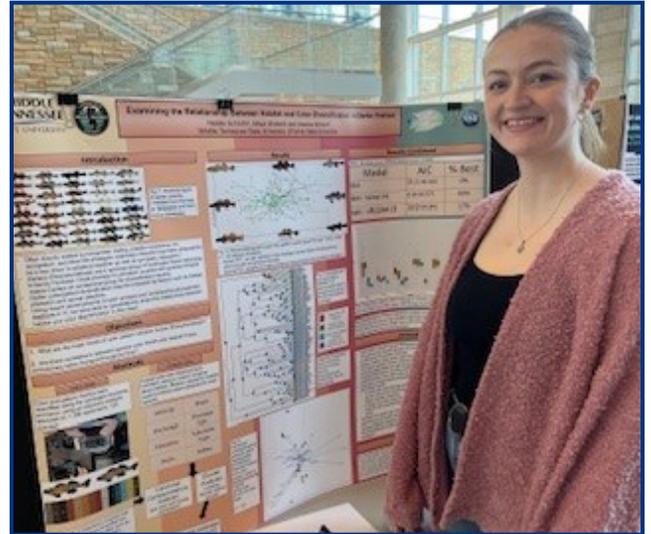
Myra Sabir, BS Biology; **Dr. Mary Farone** (faculty mentor), Biology; "Interactions Between the Novel Obligate Intracellular 'Candidates Berkella Cookevillensis' and Human Neutrophil-Like Cells"



Scholars Week - CBAS Poster Day March 12, 2024



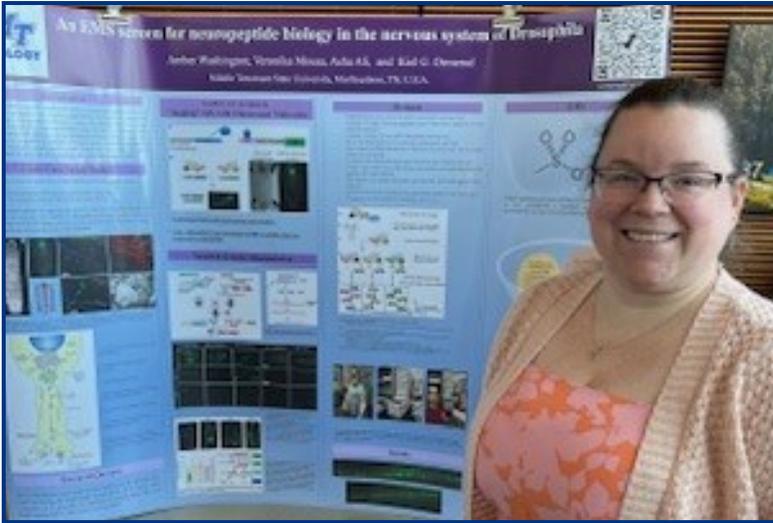
Marco Said, BS Biology; Dr. Grant Gardner (faculty mentor), Biology; "Graduate Teaching Assistants' Perceptions of Autonomy, Pedagogical Discontentment, and Self-Efficacy: A Quantitative Analysis"



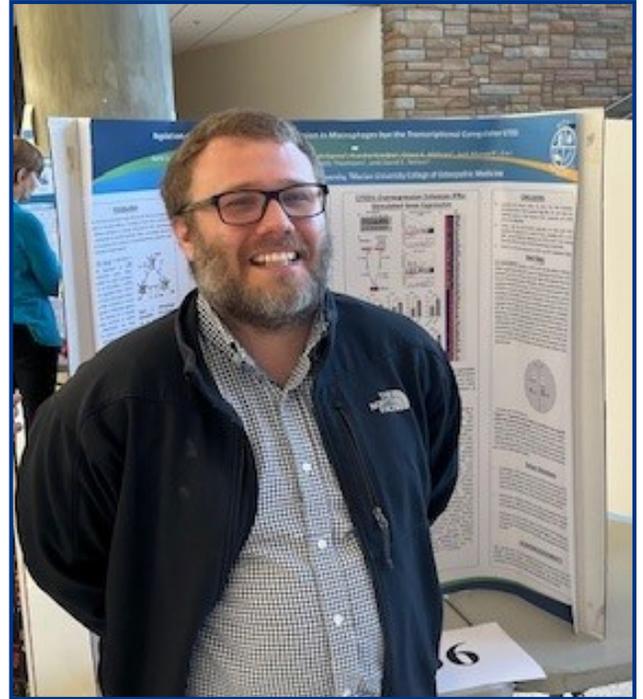
Natalie Schroth, MS Biology; Dr. Jessica Arbour (faculty mentor), Biology; "Examining the Relationship Between Habitat and Color Diversification in Darter Fishes"



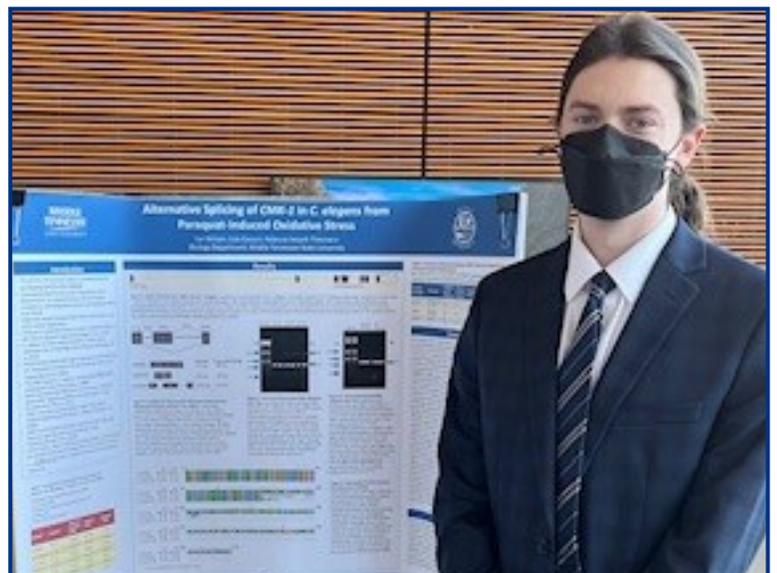
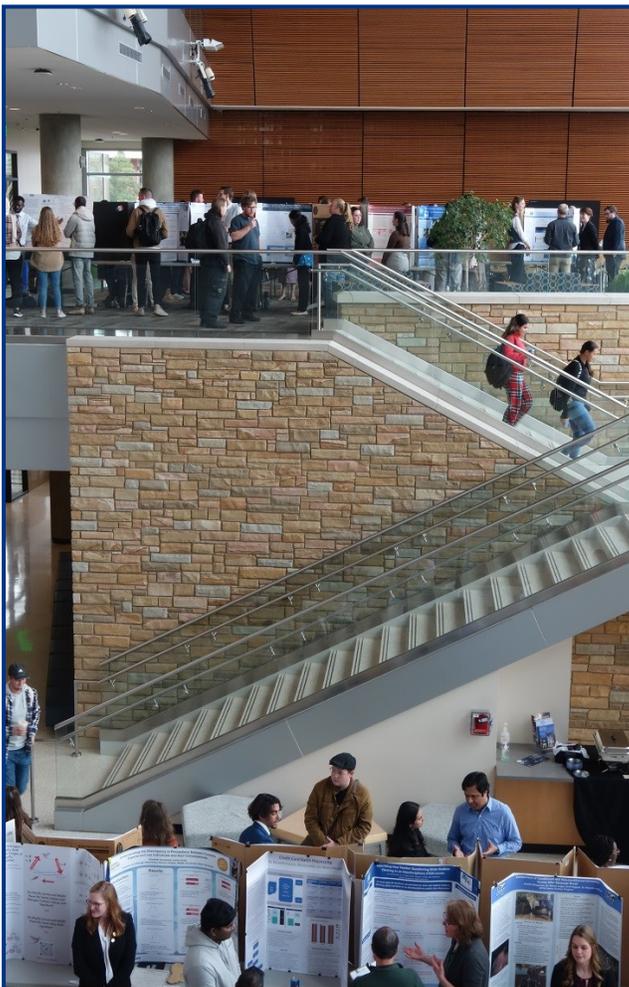
Scholars Week - CBAS Poster Day March 12, 2024



Amber Washington, BS Biology; Dr. Kiel Ormerod (faculty mentor), Biology; "Amidst Mutagenized *Drosophila* Genetically Engineered with a Fluorescently Tagged Neuropeptide to Identify Novel Proteins Involved in Dense Core Vesicle"



Derek Wiggins, PhD MOBI; Dr. David Nelson (faculty mentor), Biology; "Regulation of IFN- γ -Stimulated Gene Expression in Macrophages by the Transcriptional Co-Regulator CITED1"

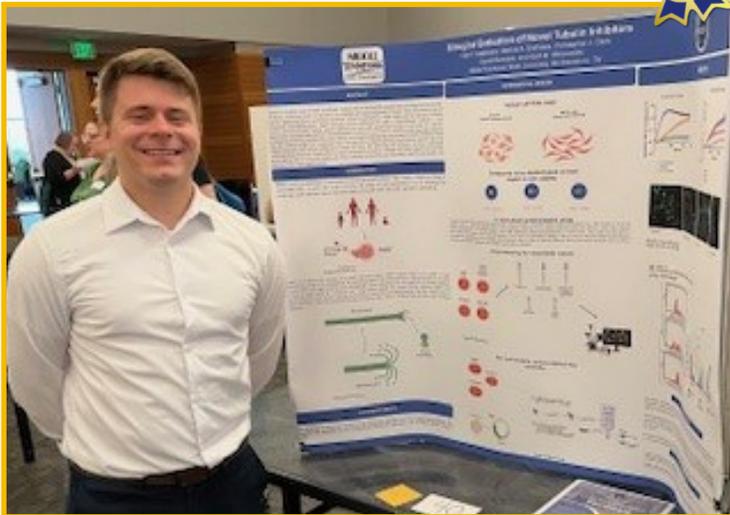


Ian Wilson, BS Biology; Dr. Rebecca Seipelt-Thiemann, Biology; Dr. Cole Easson (faculty mentor), Biology; "Alternative Splicing of CMK-1 in *C. elegans* from Paraquat-Induced Oxidative Stress"

Scholars Week March 11-15, 2024

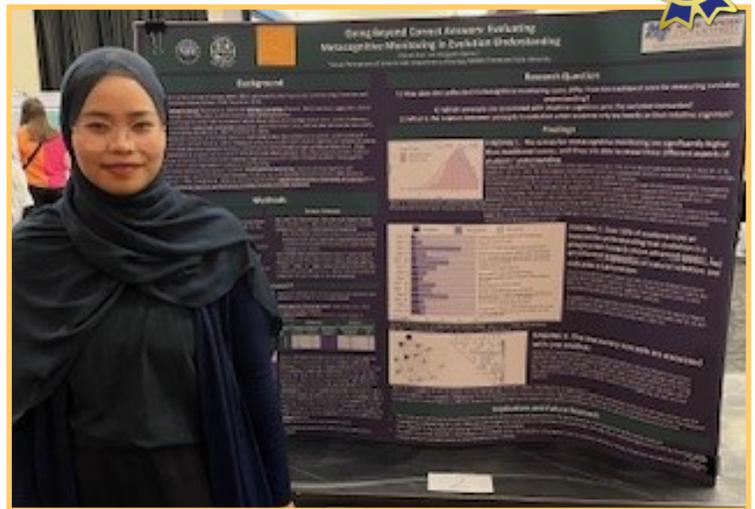
Scholars Week University-Wide Winners

Undergraduate



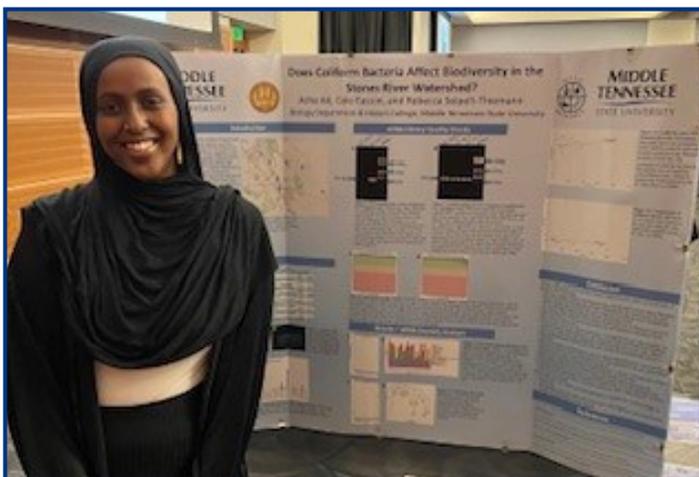
Cole Huddleston, BS Biology; **Meirola Endraws**, BS Biochemistry; Christopher Clark, PhD MOBI; Dr. Souvik Banerjee, Chemistry; **Dr. April Weissmiller** (faculty mentor), Biology; "Biological Evaluation of Novel Tubulin Inhibitors"

Graduate

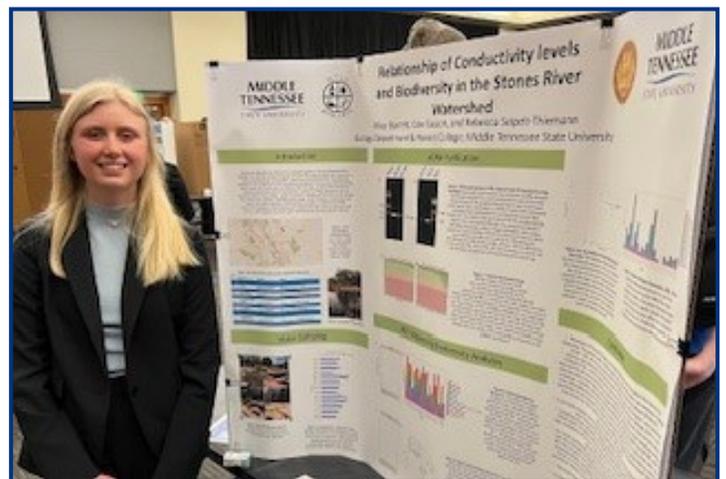


Rahmi Aini, PhD MSE-BioEd; **Dr. Elizabeth Barnes** (faculty mentor), Biology; "Going Beyond Correct Answers: Evaluating Metacognitive Monitoring in Evolution Understanding"

University-Wide Poster Exposition—March 15, 2024



Asha Ali, BS Biology; Dr. Cole Eason, Biology; **Dr. Rebecca Seipelt-Thiemann** (faculty mentor), Biology; "Does Coliform Bacteria Affect Biodiversity in the Stones River Watershed"

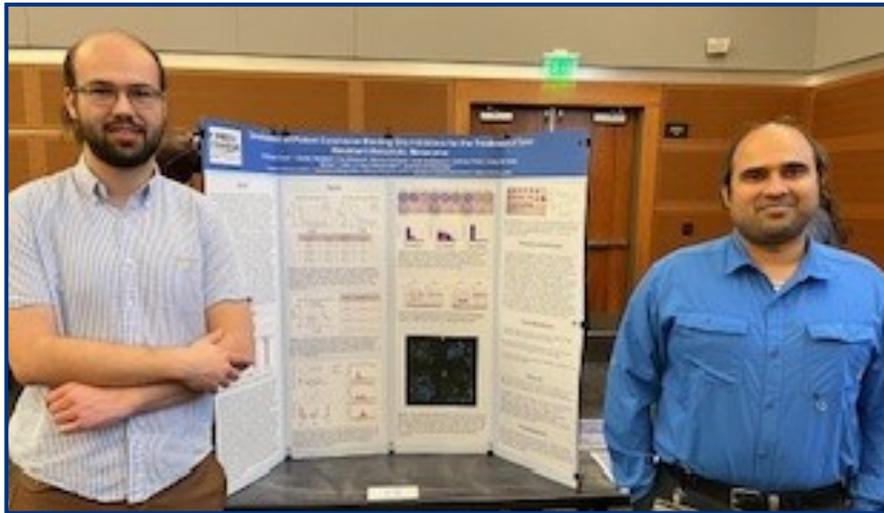


Kiley Barrett, BS Biochemistry; Dr. Cole Eason, Biology; **Dr. Rebecca Seipelt-Thiemann** (faculty mentor), Biology; "Relationship of Conductivity Levels and Biodiversity in the Stones River Watershed"

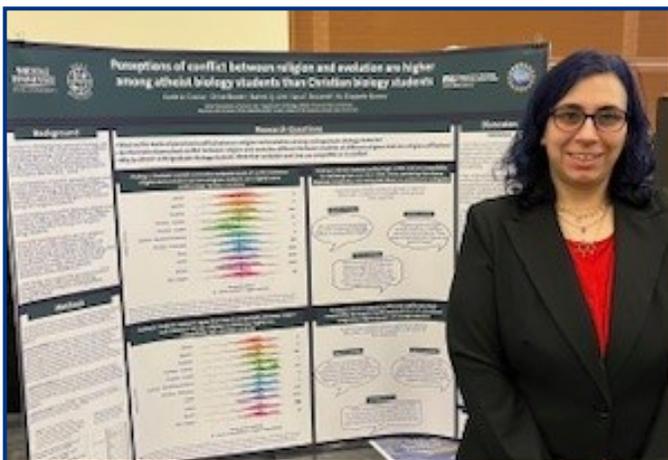
Scholars Week March 11-15, 2024

University-Wide Poster Exposition—March 15, 2024

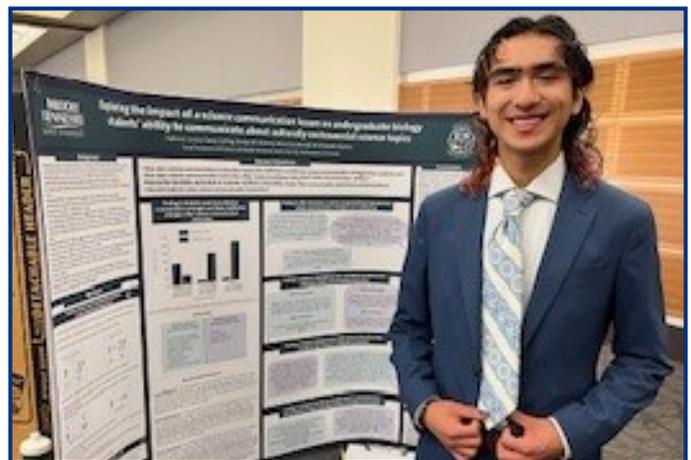
Elijah Blank, BS Biochemistry, Chemistry; **Dr. Dennis Mullen** (faculty sponsor) Biology; "Characterizing the Effects of Misinformation Regarding Pediatric Cancer in the High School Setting"



Christopher Clark, PhD MOBI; Shelby Waddell; Carl Womack, MS Biology; Meriola Endraws, BS Biochemistry; Cole Huddleston, BS Biology; Keiluhn Pulis, BS Biology; Yang Xie; Dr. Kevin Bicker; Dr. Wei Li; Dr. April Weissmiller, Biology; **Dr. Souvik Banerjee** (faculty mentor), Chemistry; "Development of Potent Colchicine Binding Site Inhibitors for the Treatment of Taxol-Resistant Metastatic Melanoma"



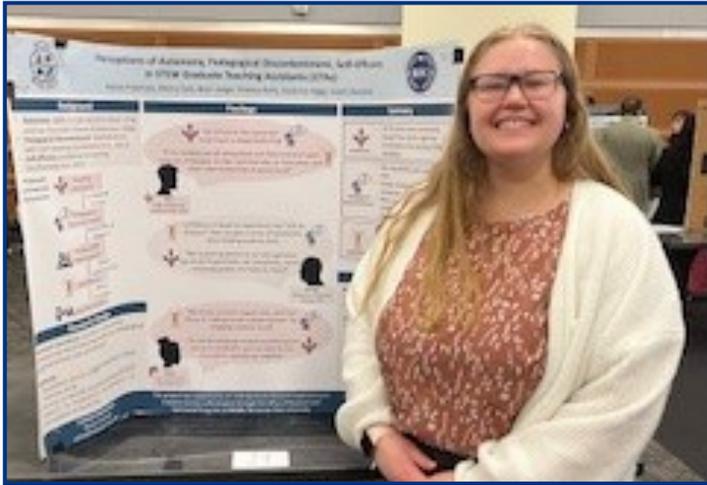
Kate Coscia, PhD MSE-BioEd; Rahmi Q. Aini, PhD MSE-BioEd; Sara E. Brownell; **Dr. Elizabeth Barnes** (faculty mentor), Biology; "Perceptions of conflict between religion and evolution are higher among atheist undergraduate biology students than Christian biology students"



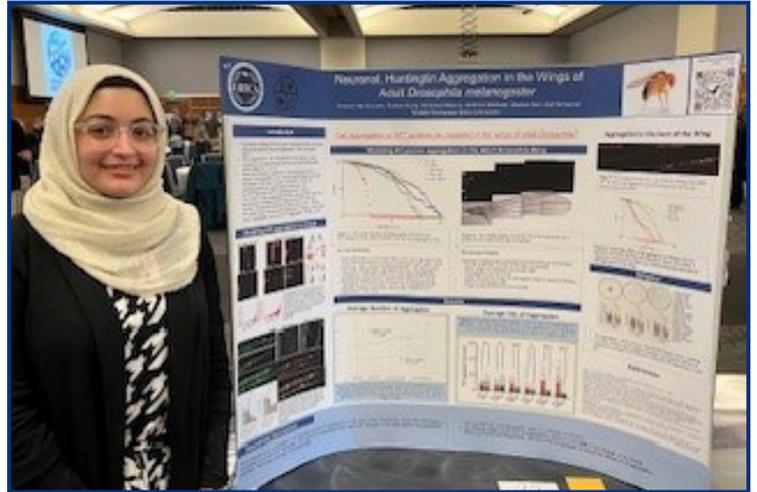
Kate Coscia, PhD MSE-BioEd; **Casey Epting**, BS Biochemistry; Donye Asberry, BS Biochemistry; Alexa Summersill, BS Psychology; **Dr. Elizabeth Barnes** (faculty sponsor), Biology; "Exploring the Impact of a Science Communication Lesson on Undergraduate Biology Students' Ability to Communicate About Culturally Controversial Science Topics"

Scholars Week March 11-15, 2024

University-Wide Poster Exposition—March 15, 2024



Alyssa Freeman, PhD MSE-BioEd; Marco Said, BS Biology; Beari Jangir, BS Biology; Chelsea Rolle, BS Biology; Kadence Riggs, BS Psychology; **Dr. Grant Gardner** (faculty sponsor), Biology; "Perceptions of Autonomy, Pedagogical Discontentment, Self-Efficacy in STEM Graduate Teaching Assistants"



Rawan Haj-Hussein, BS Biology; Tadros Hana, MS Biology; Andrew Michael, BS Science; Veronika Mousa, BS Biology; Madona Aziz, BS Biology; **Dr. Kiel Ormerod** (faculty mentor), Biology; "An Assessment of Huntingtin Aggregation in the Larvae and Adult Wings of *Drosophila melanogaster*"

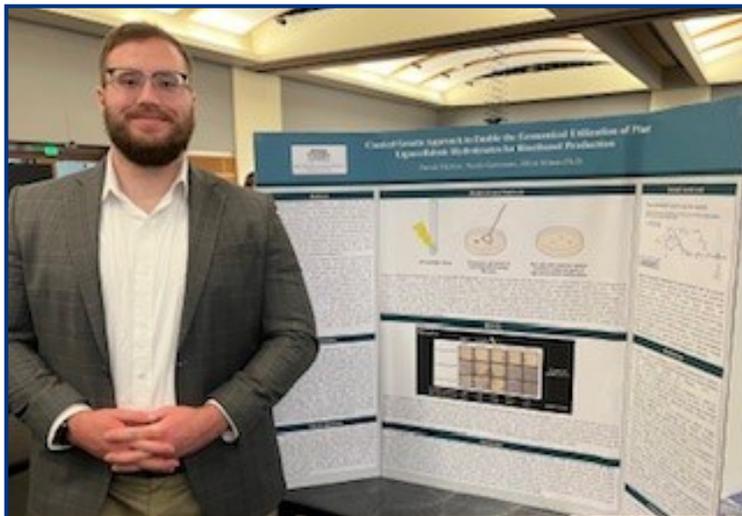


Andrew Hetrick, BS Biology; Jessica Landaverde, PhD MOBI; **Dr. Frank Bailey** (faculty mentor), Biology; "Microcystin Levels in Water, Sediment, and Invertebrates from the Stones River in Central Tennessee, USA"

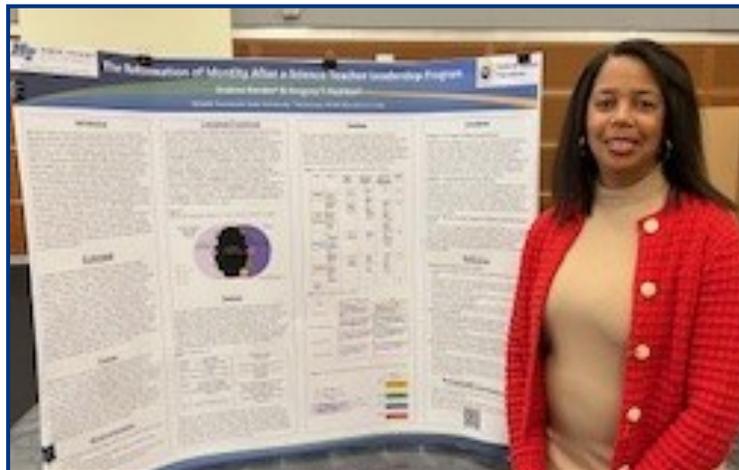


Scholars Week March 11-15, 2024

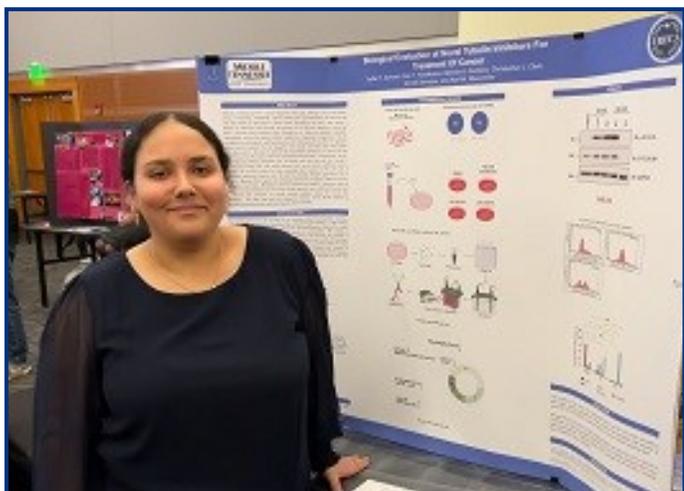
University-Wide Poster Exposition—March 15, 2024



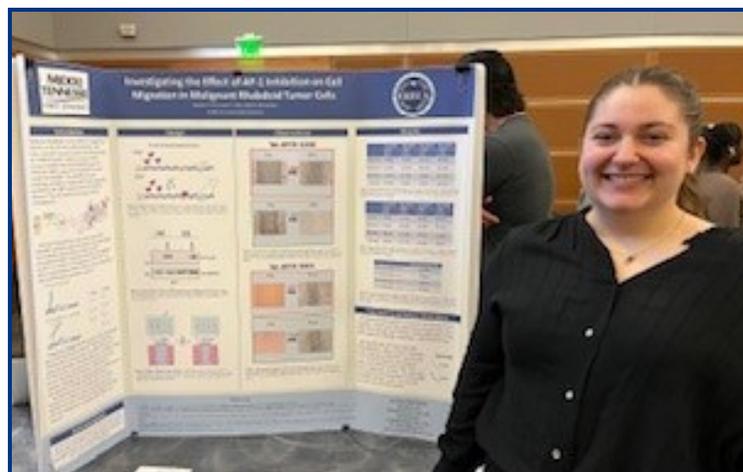
Patrick McAtee, BS Biology; Nicole Gammons, PhD MOBI; Emma Lloyd, BS Forensic Science; **Dr. Elliot Altman** (faculty mentor), Biology; "Classical Genetic Approach to Enable the Economical Utilization of Plant Lignocellulosic Hydrolysates for Bioethanol Production"



Andrea Reeder, PhD MSE-ISED; **Dr. Gregory Rushton** (faculty mentor), TSEC; "The Reformation of Identity After a Science Teacher Leadership Program"



Lydia Samuel, BS Biology; Cole T. Huddleston, BS Biology; Meriola Endraws, BS Biochemistry; Christopher J. Clark, PhD MOBI; Dr. Souvik Banerjee, Chemistry; **Dr. April Weissmiller** (faculty mentor), Biology; "Biological Evaluation of the Novel Tubulin inhibitors for treatment of cancer"



Hannah Sisk, BS Biology; James R. Evans, BS Biology; **Dr. April Weissmiller** (faculty mentor), Biology; "Investigating the Effect of AP-1 Inhibition on Cell Migration in Malignant Rhabdoid Tumor Cells"

2024 Biology Fund & Scholarship Recipients

Each year the Biology faculty is honored to be able to work with outstanding students who excel in the classroom, conduct independent research, attend courses at field stations, present papers at scientific meetings, and perform exceptionally well on national standardized tests. To help defray the costs of these activities and to recognize these students, the department is pleased to offer a number of scholarships. Although these scholarships include monetary awards, their intention is to recognize students for efforts above and beyond the expected. A description of each award can be found on the Biology website under Student Resources. The Biology faculty congratulates every student recipient.

Incoming Freshman Scholarships 2023-2024

Patrick J. Doyle Freshman Scholarship

Sandy A. Abdo

Savannah H. Barnard

Mariam A. Hana

Outstanding Student Awards 2024

Clay M. Chandler Outstanding Freshman Scholarship

Shen O. Maestre

Ralph E. Sharp Outstanding Sophomore Scholarship

Lydia H. Samuel

Philip M. Mathis Outstanding Junior Scholarship

Andrew J. Hetrick

Peter I. Karl Outstanding Senior Scholarship

Karmina A. Ghobrial

Veronika G. Mousa

Elliott P. Dawson BioVentures, Inc. Scholarship

James R. Evans

Brooks R. Leyhew

David Sanborn Ecology Scholarship

Heather E. Benz

C.W. Wiser Medical/Allied Health Scholarship

Jessica R. Parnham

2024 Biology Fund & Scholarship Recipients

Undergraduate Scholarships

Mary C. Dunn Quasi-Endowment

Zaynab A. Alnassari

Alexis A. Katz

Hannah R. Sisk

Freeman P. Jordan, Jr. Memorial Scholarship

Bailey A. Davenport

Alexis A. Katz

Hannah R. Sisk

Horace B. and Helen Weaks Reed Endowed Scholarship

Bailey A. Davenport

Bavly M. Labib

Graduate Scholarships

Sarah F. Barlow Biology Scholarship

Alyssa S. Freeman

Mary C. Dunn Graduate Scholarship

Cinthia Nicole Reed

Padgett Kelly Research Scholarship

Alex J. Rurik

Dennis Mullen Vertebrate Biology/Aquatic Ecology Research Scholarship

Chloe E. Cummins

John A. Patten Biological Field Station Scholarship

Alyssa S. Freeman

Cinthia Nicole Reed

2024 Biology Fund & Scholarship Recipients

Summer Stipends

The Department of Biology funded stipends for four graduate students to support summer research.

Carson W. Bailey

Tawakalit J. Busari

Cynthia Nicole Reed

Matthew Jake Stout

Cynthia Chappell Graduate Stipend for Summer Support

Awarded to provide a summer research stipend for one graduate student in the first year of the Biology master's program.

Hardik Bansal



Let us hear from you

BioUpdate wants to feature the accomplishments of alumni, and we encourage you to update us!

Send us your name, MTSU degree/year, and an update of your professional/career activities, awards, accomplishments. You may also include any personal news of interest that you would like to share with our readers.

Please include an email address so we can contact you if we need additional information.

Send contact information and updates to
Department of Biology, MTSU Box 60, Murfreesboro, TN 37132 Email: biology@mtsu.edu



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