MIDDLE TENNESSEE STATE UNIVERSITY

BioUpdate

Department of Biology, Middle Tennessee State University

Spring 2023

Dennis Mullen

In this issue

Message from the chair

I am excited to fill you in on all the happenings in the Department of Biology over the last year. Biology faculty and students have been very busy. They published 44 peer reviewed manuscripts (with 29 student co-authorships) and gave 37 presentations at regional/national conferences. Forty-two biology students (representing 15 faculty members) presented their research at this years Scholars Week Celebration. You can see a list of presenters and winners later in this edition. Biology faculty worked on over $5,000,000 in externally funded grants this last year.

Sadly, this year we say goodbye to several faculty members. Mr. Bill Butler retired at the end of the Spring 2022 semester, Dr. John Dubois retired at the end of the Fall 2022 semester, and Dr. Steven Wright will retire this summer. Please read the tributes to these retiring faculty later in this edition. Also, please read the tribute to Dr. Sarah Barlow, a long time member of the faculty who passed away last fall. Dr. Ryan Otter is also leaving us; he is taking a job at Grand Valley State University in Michigan.

Ending with good news, Dr. Matt Elrod-Erickson was honored with the Outstanding Teaching Award from the College of Basic and Applied Sciences. Lastly, I am very proud to announce that Lyn Powers' long record of excellent service to the department and to the university has been recognized. She received the MTSU Administrative Professional Employee of The Year Award.

Be sure to check the Biology webpage (https://mtsu.edu/biology/index.php) for up-to-date news and follow us on Twitter and Facebook.

In the News...

Dr. Jessica Arbour, professor of biology, shares her knowledge of deep sea fish in the article 'Scientists find wild fish swimming below 27, 000 feet. How it survives.' **Read More**

Dr. Sarah Bergemann, professor of biology, is the guest on "MTSU On the Record" radio program, where she discusses her participation in the discovery of life never before documented in the annals of scientific research.

Along with researchers from the University of California, Berkeley, Bergemann collected hundreds of samples of fungi on the Polynesian island of Mo'orea about 11 miles northwest of Tahiti in 2008 and 2009. **Read more** or listen to the interview with Gina Logue.

Biology

Biology professor **Liz Barnes** and her team of student and faculty biology education researchers at MTSU's Social Perceptions of Science Lab recently published a novel study about undergraduate biology student's ability to communicate effectively to their community about COVID-19. **Read More**

MTSU Ph.D. student and Biology Graduate Teaching Assistant **Nicole Gammons** stimulates her mind with data-driven research as part of the Molecular Biosciences doctoral program, but her passion is collaborating with, coordinating and mentoring young women in science, technology, engineering and math.

"By providing resources and opportunities to pursue STEM education for young women, I am building a strong foundation for networking with undergraduate and graduate students and STEM professionals and hopefully helping to usher in the next generation of females in STEM careers," Gammons said. **Read More**

Recent Publications

Cassandra Perrone, Paul Kline, John DuBois. 2022. "Cloning Successive Generations of Industrial Hemp (*Cannabis sativa*) to Assess Cannabinoid Profiles" in the December 2022 issue of Agricultural Science.

Brock Couch, Elizabeth Wybren, Mariana de Araujo Bryan, Thipphaphone Niravong, Ying Jin, Chloe Bowen and M. Elizabeth Barnes. 2022. "Exploring Undergraduate Biology Students' Science Communication About COVID-19" published on June 16, 2022 in Frontiers in Education.

Featured Faculty

Prospective MTSU anatomy students let out a heartfelt collective sigh of sadness at the news that William H. Butler was retiring in 2022. William Butler, or Bill as he was known in the department, was hired as an adjunct in the fall of 1985, and shortly thereafter, promoted to assistant professor in 1988. Bill's 34-year contribution to teaching and service in the biology department was immense, and he will be sorely missed by his colleagues as well as the students. Bill was on almost every university committee that ever existed. He knew about the inner workings of the university more than anyone I know. He often joked that teaching and university life kept him out of trouble; namely the trouble waiting for him at home in the form of a long 'honey-to-do list'.

Bill appeared to be happiest whenever he was inside a classroom interacting with students. He was perhaps the most loved anatomy teacher of all time. Bill genuinely wanted his students to succeed and they responded warmly to him. If you were lucky enough to be one of Bill's students, he would keep you engaged, entertained, and working the entire lab period. He also had some very creative ideas for keeping students on task and honest. For example, he once told me a story about deterring students from even attempting to cheat by running to the back of the classroom during test time and making a show of tearing up the test of a cheater that in fact was imaginary…of course the students didn't know that latter fact.

As a colleague, I can honestly say I never saw Bill in a bad mood. Rather, he always had a smile for you and something positive to say. And he often had a lot to say. Telling stories was one of his many gifts. Stories about the inner workings of the university or his basketball playing days were among his favorite stories to tell. Bill was such an inspiration to many of us and we will not forget his advice to "never give up because you never know what the future holds."

Your A&P colleagues

Featured Faculty

Dr. John DuBois, a native of Cleveland, Ohio, earned his B.S. in Biology at Baldwin-Wallace College and his M.S. and Ph.D. degrees at Miami University. At Miami University, Dr. DuBois trained with Dr. Lawrence Kapustka, working on physiological and ecological processes related to nitrogen and succession. He also met his life's partner, Ruby at Miami University. This summer they will celebrate their 42nd anniversary. Dr. DuBois continued his education in his post-doctoral work at the University of Wisconsin at Madison, working on nitrogen fixation in legumes under the direction of National Medal of Science recipient, Dr. Robert H. Burris. Dr. DuBois and Ruby welcomed their daughter Adrienne while at UW-Madison. He joined the MTSU Department of Biology in the fall of 1989, coming from a faculty position at Albion College in Albion, Michigan.

Dr. DuBois retired at the end of fall semester 2022, having contributed much in his thirty-three years as a member of the Biology Department. He taught thirteen different courses, the majority at the undergraduate level. He developed an Honor's specific version of our Biology 1000 course that prepares students for success in the major. Dr. DuBois was also active in nurturing and supporting young scientists as an active scientist himself. He successfully mentored four M.S. thesis students, 20 MTSU honors thesis students, and guided 21 URECA research projects. He authored over 20 research publications, 70 research presentations, and one textbook. Additionally, he served as the Faculty Advisor/Consulting Editor of the MTSU e-journal, Scientia: The Journal of Student Research for twelve years. His dedication to teaching and mentoring young scientists is highlighted by several awards including his recognition by the Honors College with the Outstanding Honors Faculty Award and by his students recognizing him numerous times as a Faculty Member that Makes a Difference. In August 2022, he was awarded the status of Professor Emeritus by President McPhee.

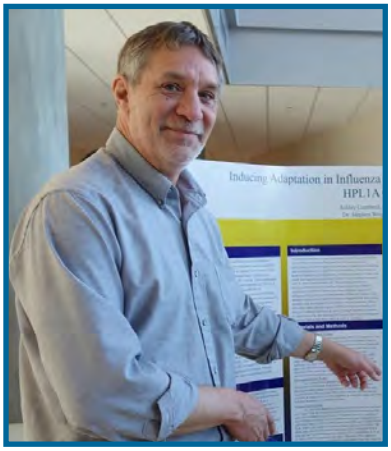
Dr. John Dubois receiving Professor Emeritus status in August 2022.

Not only has Dr. DuBois remained active in teaching, mentoring, and research, he is very involved with the broader MTSU community and beyond. He served as principal investigator or co-principal investigator in five funded education research projects. He was a Co-founder and Co-Director (for five years) of the MTSU Center for Environment and Energy Education, which serves as a resource for area teachers. He also conducted nearly 40 teacher education workshops for middle Tennessee K-8 teachers. Finally, Dr. DuBois served on and chaired the Honors Council, and has been recognized by the Honors College with the Exemplary Faculty Service Award.

Most recently Dr. DuBois and his students have worked with Dr. Tony Johnston in the Fermentation Sciences program to investigate propagation techniques for Norton/Cynthiana grape cultivar and with faculty in the MTSU Tennessee Center for Botanical Medicine Research to investigate cannabinoid production of various hemp cultivars. Dr. DuBois plans to continue some of that work post-retirement when he is not visiting with his grandsons, Henry and Arthur in Miami, Florida.

Featured Faculty

Dr. Stephen Wright will be retiring this summer after thirty one years of service to the MTSU Department of Biology. Steve joined the faculty in the fall of 1992 after completing a postdoctoral fellowship at St Jude Children's research Hospital. In his three decades as a member of this department Steve has had a significant and lasting impact on the quality of the undergraduate and graduate level experience of our students. He taught seven different undergraduate and graduate courses and developed the Honor's Microbiology course. He mentored fifteen MTSU honors thesis students, over 50 non-honors undergraduate students on research projects, as well as eighteen Biology MS students. Steve is a recipient of The MTSU Foundation Outstanding Teaching Award, the MTSU Honors College Outstanding Honors Faculty Award (received twice), and the Tennessee Academy of Science Distinguished University Teacher Award.



Steve has had a distinguished research career at MTSU. He is an author or coauthor on twenty-five peer reviewed publications and one US patent. He is a PI or Co PI on grants and contracts totaling over $1.7 million dollars. His research on infectious viral diseases has been funded by The National Science Foundation, The Department of Education, and The Department of Homeland Security. Much of this research was conducted collaboratively with colleagues from the departments of Chemistry and Physics and Astronomy. All of his research incorporated graduate and/or undergraduate students. He has received the College of Basic and Applied Sciences Distinguished Research Award and the MTSU Foundation Award for Research Excellence. Steve is a Fellow and past president of the Tennessee Academy of Sciences.

Steve served as the Assistant Chair of the department for over 10 years. He also served as the Biology Shepherd for planning our new science facilities. In that role he worked for several years with the administration, the architects, and the faculty to design and bring this building from the wishful thinking stages of the early 2000's to reality in 2014.

Steve's commitment to the biology department was an inspiration to other faculty members. He would drop by faculty offices for "little chats," sharing inspiring student stories, ideas about how we can be a better department, or just asking "How are you?"

If you ask Steve what he is most proud of from his career at MTSU (I did), he will tell you it is the time that he spent working with students and all that they have accomplished. Steve chose MTSU because of the strong student focus of the university and the department. He dedicated his career to touching the lives of our students through his mentorship and his teaching and has long been one of the students' most beloved faculty members.

Steve is looking forward to having more time to spend with Shelly, their daughter Rachel, and their granddaughter Ava. He plans on being busy with house projects, gardening and fishing and will continue to serve his community through volunteer activities.

We will miss you, Steve.

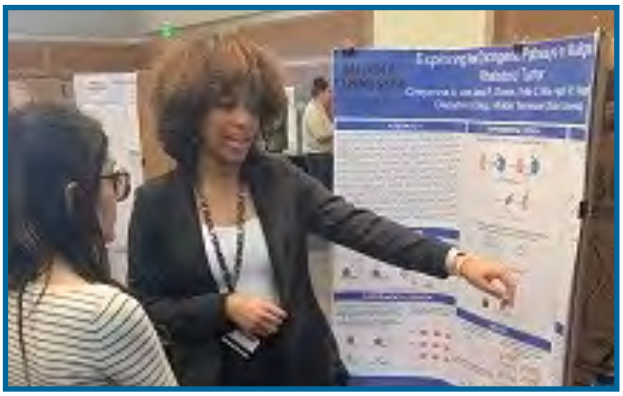
Biology Lab Updates

From the lab of April Weissmiller

The Weissmiller laboratory welcomes **Cassandra Perrone** as a new MS biology student. She will be working on understanding the molecular mechanisms at work to maintain a rare type of ovarian cancer called SCCOHT.

Of the many undergraduates that are part of the Weissmiller lab, there are several updates of their successes this year as you will see below:

Cheyenne Jones completed an all-expenses paid summer internship at the University of California San Francisco, was a co-author on a study we performed that was published in *Oncogenesis* and she was a first author on a review that was published in *Epigenetics Insights*. She was also awarded a Silver URECA grant and won second place in a poster presentation at the TLSAMP annual conference. In November 2022, Cheyenne presented her summer work at the Annual Biomedical Conference for Minoritized Scientists (ABRCMS) in Anaheim, CA with the funding from a competitive ABRCMS travel award she received.



Alexandria Williams , left, was awarded a Silver URECA grant and has received early acceptance to a NSF REU program at Notre Dame. This program is all-expenses paid summer internship at Notre Dame in a research laboratory. (**Sarah Streeter,** right)

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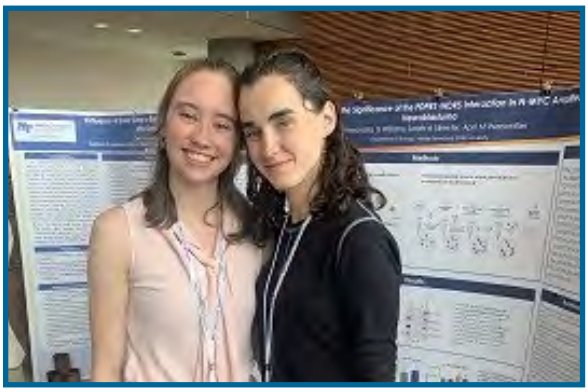
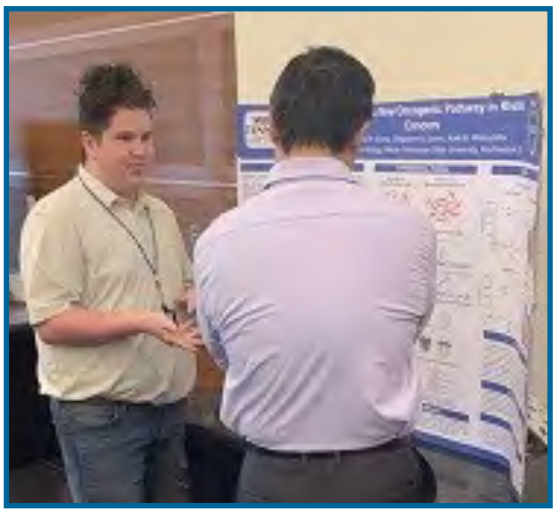
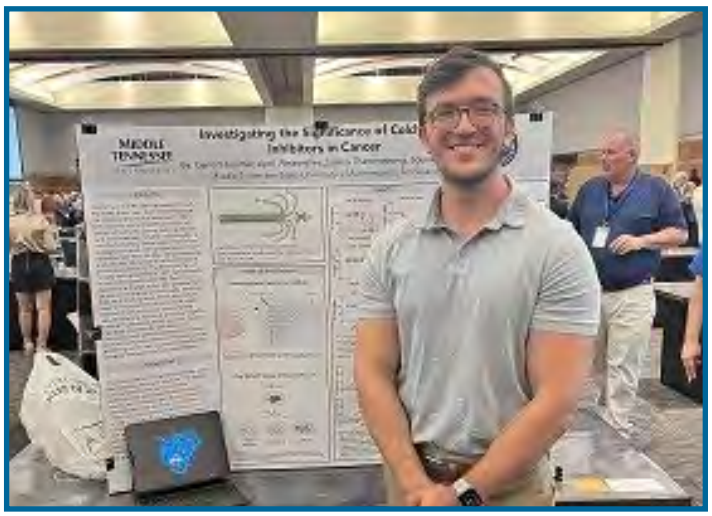


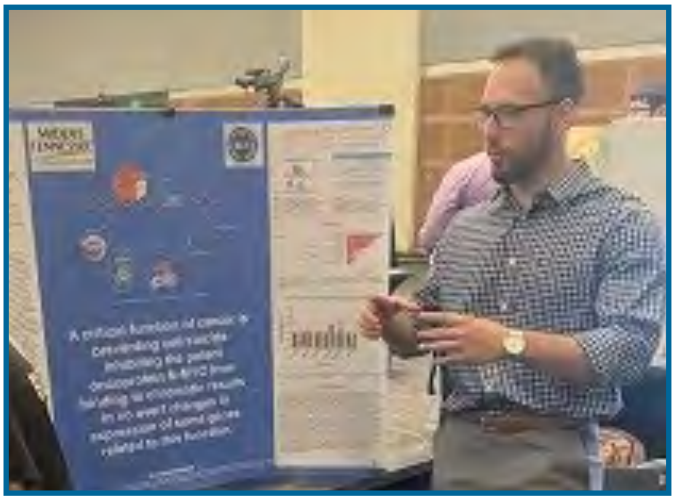
James Evans was awarded a Silver URECA grant and has received early acceptance to the University of California Los Angeles Bruins-In-Genomics (BIG) Summer program. The BIG program is all-expenses paid immersion program for students interested in genomics and quantitative science approaches.



Garrett Tessmer and **Sarah Streeter** were both awarded Silver URECA awards to support their work in various cancers such as ovarian cancer and neuroblastoma.



April Weissmiller, cont.

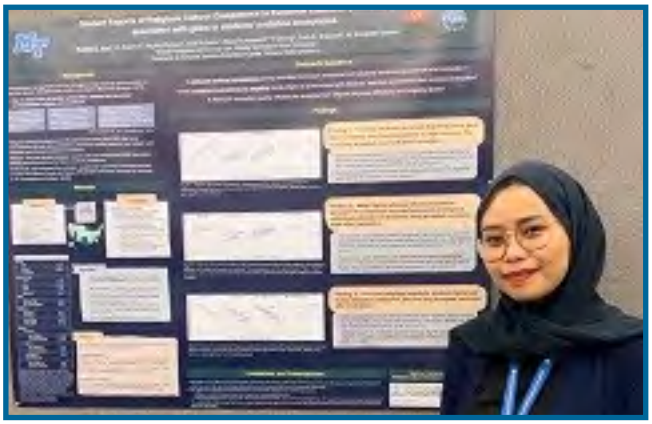


Jesse Scobee was awarded funding to present at prestigious Posters for the Capitol and the WorldCUR conference, which is an international conference for undergraduate students.

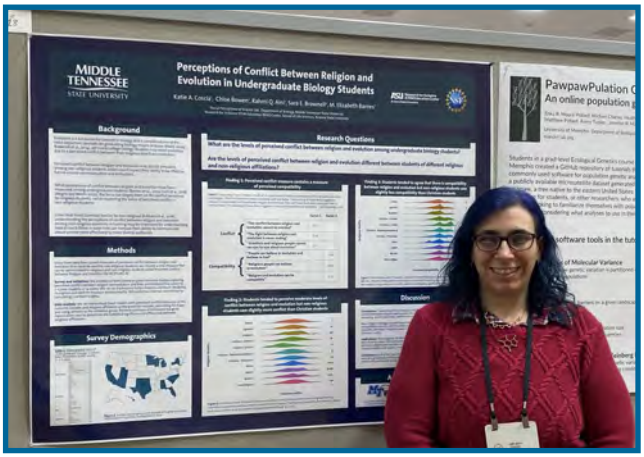
Garrett Tessmer, Alexandria Williams, Jesse Scobee, Cheyenne Jones, Sarah Streeter, James Evans

Kaylee Chisam graduated in December 2022. She will be continuing to work in the Weissmiller laboratory while she applies for PhD programs this year. Kaylee also presented her research at the Annual Biomedical Conference for Minoritized Scientists (ABRCMS) in Anaheim, CA with the funding from a competitive ABRCMS travel award she received.

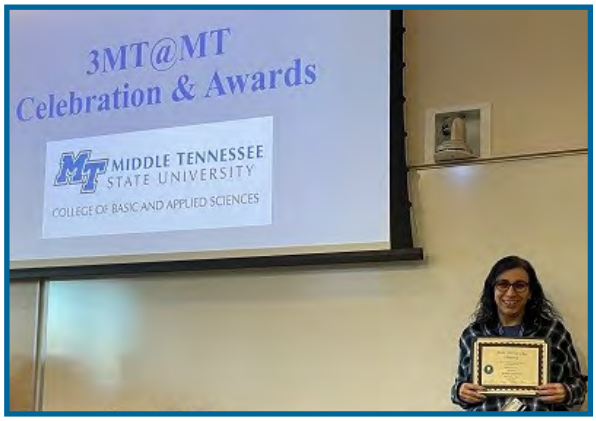
From the lab of Liz Barnes



Ph.D. student Rahmi Aini won a graduate student poster competition award at both SABER and NABT for her research on evolution education



Ph.D. student Katie Coscia presented her research at the Association of Southeastern Biologists conference in March and was recognized as a winner of their graduate support award.



Katie Coscia also won an award for the 3MT competition at MTSU for her work on the perceived conflict between religion and evolution among undergraduate biology students.

Biology Lab Updates

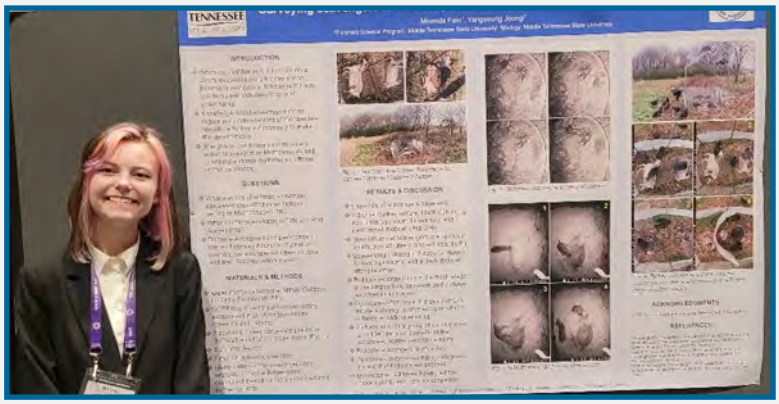
From the lab of Yangseung Jeong

At the 75th annual meeting of American Academy of Forensic Sciences (AAFS) in February 2023, the Ellis R. Kerley Research Award was presented to Dr. Jeong for his research about a new technique to sort commingled skeletal remains using Korean CT scans. Three undergraduate students (Charlene Sullivan, Omar Ali, and Marcus Luciano) assisted in the research as co-authors. Currently, Dr. Jeong is applying his methodology to the WWII remains (i.e., the service members killed during the Pearl Harbor attack in 1941) to generate a U.S. specific model in collaboration with the Defense POW/MIA Accounting Agency (DPAA). Recently, Dr. Jeong has been appointed as an external consultant of the Korean National Police Agency and will assist in forensic investigations in South Korea.

Dr. Yangseung Jeong receiving the Kerley Award at AAFS

Shannon Velasquez won first place in the master's division of the 3MT@MT competition in the Fall 2022. She presented her thesis research about developing a digital pair-matching method.

Aaron Gatewood is analyzing the scavenging behavior of bobcats from a forensic perspective for his honors thesis. For this longitudinal research, six deer carcasses have been deposited at the MTSU Outdoor Forensic Facility (MOFFF) with motion cameras.



Miranda Fain gave a poster presentation at AAFS in February 2023. Her research was about the scavengers of the Middle Tennessee area and attracted many people's attention. She is analyzing skeletal trauma inflicted on the bones by the scavengers and presenting the results at 2023 MTSU Scholars Week.

Biology Lab Updates

From the lab Rebecca Seipelt-Thiemann

Dr. Seipelt-Thiemann and students in the Honors Genetics (BIOL 3251H) course worked with Dr. Cole Easson on a Course Undergraduate Research Project on species diversity in the Stones River Watershed. We used field, bench, and computational techniques to identify species at eleven sites in the Stones River Watershed using Next Generation sequencing of environmental DNA (eDNA) collected from running water. The class also evaluated different water quality parameters and climate data. Many of these students presented their research posters at Scholars Week in College of Basic and Applied Sciences or University-wide session.

Spring 2023 Honors Genetics (BIOL 3251H

Biology Lab Updates

From the lab Rebecca Seipelt-Thiemann

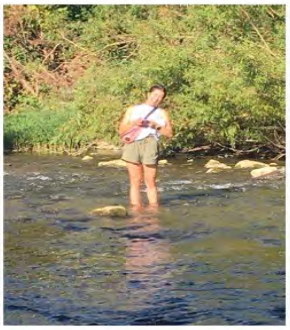


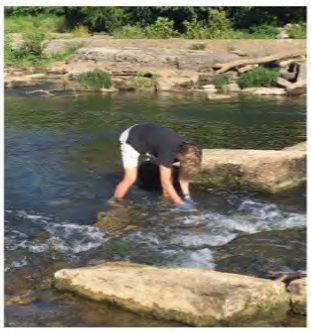













Biology Lab Updates

Updates from the Gardner Research Team

Following a challenging couple of years with covid restrictions, the 2022/2023 academic year has been a time of renewal for the Gardner Research Team. In the Summer 2021/2022 we graduated three of our long-time doctoral candidates. Dr. Zhigang "Jacob" Jia completed his work (June 2021) on instructional challenges of international graduate teaching assistants and started a job as a post-doctoral researcher at Trinity-Washington University in Washington, DC. Dr. Olena James completed her work (April 2022) on biology faculty's technological pedagogical content knowledge and took a job as an instructional professor at Belmont University in Nashville. Dr. Brock Couch completed his work (June 2022) on student small group learning around socio-scientific issues and took a job as a post-doctoral researcher at the University of New Hampshire. We welcomed a new doctoral student to the team in the Fall of 2022, Alyssa Freeman, who comes to us from Idaho State University where she completed her Masters in Biology Education Research. We have also welcomed two new undergraduate researchers to the team, Chelsea Rolle and Kadence Riggs. These two successfully developed, applied for and received MTSU URECA funding to study the interactions of pedagogical discontentment and teaching autonomy in STEM graduate teaching assistants and will complete that work this academic year.

Dr. Olena James, Dr. Grant Gardner, Dr. Brock Couch

Former doctoral student **Josh Reid** presenting his work at the National Association of Research in Science Teaching conference. Josh recently began work as an Assistant Professor at Texas Tech University.

Biology

Biology Lab Updates

Mary and Anthony Farone Family/Lab News

Dr. Tony's current PhD student **Dan Bryant** has published his first, first author manuscript based on his work: Bryant, D.L., Kafle, A., Handy, S.T., Farone, A.L. and Miller, J.M., 2022. Aurone-derived 1, 2, 3-triazoles as potential fluorescence molecules in vitro. *RSC advances*, *12*(35), pp.22639-22649 and has presented a poster at the The American Society for Biochemistry and Molecular Biology. Dan will also be getting married this April!

Dr. Raj Ghosh has been promoted to a Scientist II-Analytical Development at Seres Therapeutics in Cambridge, MA.

Dr. Erin Park has been promoted to Assistant Director of Operations at American Esoteric Laboratories in Memphis.

Corbett Ouellette (MS with Dr. T) is a PhD student in Immunology at Georgia State University.

Marshall Baughman (MS with Dr. T) recently has taken a position as a Software Engineer at Concert Genetics in Franklin.

One of our favorite NSF Fellows, **Paola Molina**, is a postdoctoral fellow at Vanderbilt and recently had her first baby, Thomas!

Dr. Nick Chamberlain (NSF GF) has moved from the Rocky Mountain Labs in Montana to Alaska with his Air Force fiancé.

Dr. Jacob Sanders (NSF GF) has taken a lecturer position in the Biology Department at UTK.

Dr. Katie Sampuda Roeder (NSF GF) is now a site manager at Eurofins in NC and also recently had a baby.

Dr. Ashley Elliot Posey (NSF GF) has been promoted to Chair of the Science Department at Baylor School in Chattanooga and also recently had a baby!

Paola, Anthony, and Thomas

Elliott Maebelle Posey

Katie Sampuda Roeder and Gabe

Biology Lab Updates

Mary and Anthony Farone Family/Lab News

Alison Carey Webb, PhD (NSF GF) has started up a biology outreach company Pacific Northwest Biology in Seattle https://www.pnwbiology.com/about-1 and recently zoomed with my freshman seminar class and has two children.

Patrick Havlik, PhD (NSF GF) is a Scientist at Atsena Therapeutics in Durham, NC.

Andrew Trivette, MS (NSF GF) is an Associate Application Developer at the Vanderbilt Vaccine Center.

Mary's PhD students, **Desta Kidane** and **Csilla Szepe** are doing well. Desta has also published a first author manuscript: Kidane DT, Mehari YT, Rice FC, Arivett BA, Gunderson JH, Farone AL, Farone MB. The inside scoop: Comparative genomics of two intranuclear bacteria, "Candidatus Berkiella cookevillensis" and "Candidatus Berkiella aquae". PLoS One. 2022 Dec 30;17 (12):e0278206. doi: 10.1371/journal.pone.0278206. PMID: 36584052; PMCID: PMC9803151. Csilla is continuing to characterize the antimicrobial effects of botanical-based compounds but has taken some time off from the lab to bring forth a different type of biology experiment, Izabella!

Mary's MS student, **Trey Borders**, is determining if the CC99 bacterium can be transferred between different mammalian tissue culture cell types and **Alyssa Everhart** has started the MS program.

Mary's undergraduates **Sydney Thompson** and **Sidney Raburn** are both researching interactions between the novel bacteria (HT99 and CC99) and protozoan hosts. Looks like it will be another busy summer for the Farone lab!

Our undergraduate research students are also doing well. **Sydney Ferguson** presented a research poster at the MTSU Scholar's Day on her work with aurones that decrease inflammatory cytokine expression. Sydney has been accepted into the Medical Laboratory Scientist program at Vanderbilt University and is also the granddaughter of the famous TV Chef, Graham Kerr (The Galloping Gourmet!!!).

Shivam Patel is making good progress in screening novel aurone compounds for cytotoxicity on a mouse fibroblast cell-line as part of his Honors Thesis project and scored a 98 percentile on the DAT!

Sydney Ferguson and grandfather, Graham Kerr

Biology Lab Updates

Mary and Anthony Farone Family/Lab News

L-R top Sydney Raburn, Dr. Tony, Dr. Mary, Trey Borders

L-R bottom Alyssa Everhart, Sydney Ferguson, Dan Bryant, Desta Kidane

Most importantly, our daughter Grace and her husband Jorge had a little girl last July 31! Emma Rose is now almost 8 months old and doing great!

Study Abroad

Biology Class Goes to the Tropics

The MTSU Department of Biology offers a summer study abroad course BIOL 4330 "Tropical Biology in Costa Rica". This class has been offered in 2016, 2017, 2019, and for a fourth time in 2022. In May 2022, Drs. Vince Cobb and Steve Howard took 11 biology undergraduate students to Costa Rica to study the biodiversity, conservation, and ecology of neotropical forests. The class spent the majority of their time at the internationally-recognized La Selva Biological Station. La Selva is 1,536 hectares of a lowland tropical rainforest receiving approximately 4 meters of rain per year (compared to the 1.5 meters of rain per year in Tennessee). Students get a real taste of life in the tropics as it is hot, humid, and there is little air conditioning to be found. Besides hiking trails both day and night, and taking notes, students conducted a group research project. The goal of the project was to estimate the daily amount of leaf material leaf-cutter ants removed from forest trees and delivered to their large nest mounds.

Conversing with a nature guide on a trail at La Selva Biological Station

Leafcutter ants form these busy trails that can be over 100 m in length which lead from a source tree to their nest

Once leaf trimmings are brought back to the nest, they are cut into much smaller pieces before being inoculated with a fungus.

The ants, which number into the low millions per colony, use the leaf material as a substrate for growing an underground fungal garden upon which they feed.

After a week at La Selva, the class traveled to the Monteverde Cloud Forest Reserve for a comparison of lowland and mountainous tropical forests. Although still humid, the higher elevation of the cloud forest keeps the climate pleasant but chilly at night. Here students had excellent views of the Resplendent Quetzal, a bird which many say is one of the most beautiful the world.

Dr. Steve Howard lecturing to students after lunch prior to a hike along a river trail.

Study Abroad

Resplendant Quetzal in the Monterverde Cloud Forest. They feed on thumb-sized avocados.

Venomous Fer-de-lance just two feet off the hiking trail spotted during a night hike.

Two-toed Sloth hanging in a tree over the river during a boat ride.

Termite nest high on the trunk of this tree. Instead of being on the ground, this termite species always has nests up on trees. Some birds make holes in old termite nests to raise their own chicks.

Strawberry poison dart frogs are common at the La Selva Biological Station. Unlike many frogs, dart frogs are diurnal.

Helmet-headed basilisk lizard in the forest trying to go unnoticed.

Study Abroad

Collared Aracari is a small toucan ranging from southern Mexico to Ecuador that is common in tropical lowland forests.

Baby mantled-howler monkey peeking down from the canopy. Howler monkey calls can be heard as far as 2-3 miles.

Currently, there are 11 more undergraduates planning to take the course during May 2023, which will be led by Drs. Vince Cobb and Jeff Walck. For 2023, we are adding additional sites to the course schedule, the dry tropical forest at Palo Verde Biological Station and Playa Samara on the Pacific coast for snorkeling and viewing coral reef. This is a course we hope can be offered every summer as the experience is transformative for students in their development as young biologists.

Tropical Biology class in 2022

Biology Updates

Kim Sadler's News
Center for Cedar Glade Studies

The Center for Cedar Glade Studies has partnered with Cedars of Lebanon State park for the past 17 years to celebrate this unique and often misunderstood ecosystem. Coming out of winter, springtime is a floral explosion in cedar glades. Some of you may recall this floral display (with fondness) as you conducted your ecology research project at Flat Rock Cedar Glades and Barrens, just 5 miles from campus. Weather permitting, hikes and activities led by experts, featuring everything from birds to geology, bring us the natural history of Middle Tennessee. This is the 45th year of the event, formerly the Wildflower Pilgrimage, renamed in 2007 to honor Dr. Elsie Quarterman, an ecologist at Vanderbilt that studied, along with her students, cedar glades in Middle Tennessee. The Elsie Quarterman Wildflower Festival date may have passed by the time this edition of BioUpdate is posted but just in case, the 2023 dates are: May 5 & 6 at Cedars of Lebanon State Park. Mark your calendar for 2024, May 3 & 4. Visit www.mtsu.edu/glade-center for more information.

Bekka Riley and Alex Romer facilitated the *All About Animals* table at the 2022 EQ Festival

Kim Sadler with EQ Festival 2022 Trip Leaders: Holly Taylor, TN State Associate Naturalist and Milo Pyne, Botanist. NaturServ, retired

The CCGS co-hosted the 2022 Research Roundtable with the Tennessee Plant Conservation Alliance on April 28. There were more than 30 people attending representing resource management, universities, and other agencies. After updates about projects, the group toured areas led by state Natural Area Ecologist, Sam King. The Tennessee Division of Natural Areas (DNA) has been a supporting partner of the CCGS from the inception of the Center in 2005 through their expertise, grants, and other capacities. In appreciation for their continued support CCGS presented DNA with a token of appreciation.

Biology Updates

Jason Miller, DNA; Sam King, DNA; David Lincicome, DNA: Allen Trently, DNA (back); Jeff Walck and Kim Sadler, CCGS co-directors

Arisaema dracontium,
Green Dragon Juvenile
(found in glade woodland edges)

Field trip to Cedars of Lebanon Natural Areas
currently under restoration

Biology Updates

Center for Environmental Education from Kim Cleary Sadler, Director

What the CEE does best is collaborate and we have continued to provide outreach to the community through several on-going programs and projects. The microscope and materials loan programs continue to be popular. My classes are involved with assisting me with the Arboretum by providing photographs and updates about the 30+ trees listed. The construction on MTSUs campus is never-ending and unfortunately, several of the older tree specimens are losing ground to the wheels of progress. A special shout out to Kylie Moe and Lindsey Reynolds for helping me keep the weeds at bay in the Monarch Way Station garden in the courtyard of the Science building, too. I can always use help in the garden and donations of native shrub and herbaceous species are always welcome.

I miss seeing Cindi Smith-Walters on a day-to-day basis but she still serves as the CEEs most active volunteer. She and her husband Dave have conducted TN Naturalist Workshops on Forestry, worked with Rutherford County Master Gardeners - helped with 2023 Tree Day (sorted tree orders and handed out orders), pruned grapevines in spring, and worked in the fall harvest and juicing (she said the juice was fabulous). She and Dave have been active in Boy Scout Leader Trainings, too. As a side note, they have only 8 more Tennessee state parks to visit and hike; it sounds like Cindi knows how to enjoy retirement!

Zena Tenenbaum is a former student that worked with me on a longitudinal research study about citizen science internships with the Great Smoky Mountains Institute at Tremont. She was also a volunteer for the CEE and moved out of state after she completed her MS degree. I caught up with her recently and she shared this photo of her with her daughter, River (6th grade). They live in Dickson now and Zena told me that I would be happy to know River loves science. I honestly was not surprised; Zena spent months of her pregnancy at Vanderbilt and we talked for many hours about her research project and environmental education during that time.

River and Zena

Tennessee Nutrient Reduction Collaborative Project
We are happy to report the Nutrient Reduction Toolkit is near completion, with TDEC partners meeting in April for a final sign off. This project brought together faculty from biology and agriscience, in addition to Cynthia Allen from Environmental Engineering, and Christina Byrd from the Center for Human Health Services to create an informational Toolkit to be used by educators, agricultural groups, waste management agencies and other entities responsible for informing others about nutrient reduction regulations and practices. As one of the twelve border states to the Mississippi River, the consequence of the accumulation of nutrients from these states, plus those surrounding states with watersheds that drain into the Mississippi River, creates a huge annual “hypoxic dead zone” in the Gulf of Mexico every spring. Reducing nutrients into Tennessee waterways may seem like something that is someone else’s responsibility or problem to deal with, but it turns out there is a great deal each of us as citizens can do.

Biology Updates Sadler cont.

Tennessee Amphibian Monitoring Program

Bob English, director for the Tennessee Amphibian Monitoring Program (TAMP), reports the program is steadily building routes statewide in 2023. He said, "This will be our best year since the pandemic. This is due to the success of the TAMP website in making it easy to become a TAMP volunteer, and the promotion of the TAMP program in the Tennessee Conservationist magazine and the Tennessee Naturalist Program (tnnaturalist.org) ."

For the first time since the pandemic, Bob was able to conduct a TAMP workshop for the University of Tennessee Department of Wildlife and Fisheries. The University of Tennessee has been running routes for the TAMP program since 2002, and for more than 20 years, the enthusiasm of their students is always an inspiration.

With warming winters, we are hearing certain species calling earlier in the year. A decade or two ago you rarely heard Pickerel Frogs calling before the first of April. In past years Bob said he started hearing them in March. This year, for the first time, Bob had a Pickerel Frog calling on February 20th. A few days later, in the grace period for the first sampling period, two TAMP volunteers heard Pickerel Frogs calling on their routes. Both dates were in February! A new volunteer sent a recording at one stop where Spring Peepers, Southern Leopard Frogs and Pickerel Frogs were all calling (Natural Calendar March 2023 (leaps.ms). While this is exciting, it's also concerning, as other species may be adversely impacted by climate change. But it underscores the importance of our TAMP data over time. As in previous years, all TAMP data for the 2023 season will be entered into the GIS-based TAMP database.

The integrated database containing all TAMP data from 2004 to 2023 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). The SWAP plan addresses the management of non-game species of greatest conservation need in the state, and we are happy to be part of this effort.

Pickerel Frog
Lithobates palustris
Pickerel Frog © 2023 Robert English Leaps

BIOLOGY STUDENT TRAVEL

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

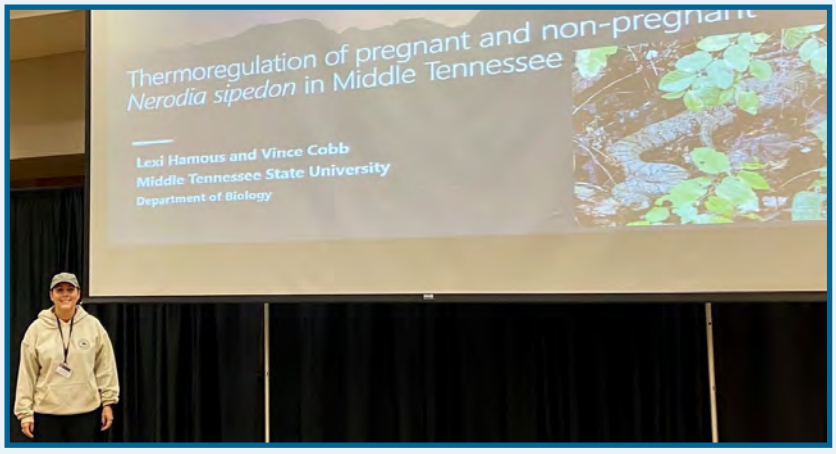
Alexis Hamous

Tennessee Herpetological Society Annual Conference

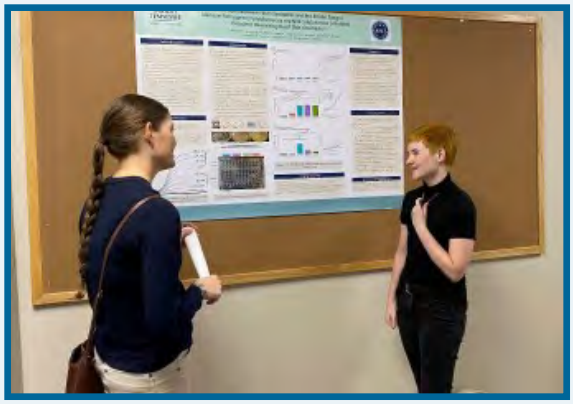
Austin Peay University, Clarksville, TN

September 29 and 30, 2022

Lexi Hamous (MTSU MS May 2022) and Ori Bergman (MTSU undergraduate) attended the annual Tennessee Herpetological Society Conference held at Austin Peay State University. Lexi started the conference by presenting her masters research on "Thermoregulation of pregnant and non-pregnant Nerodia sipedon in Middle Tennessee". Ori presented a poster over the research completed as a URECA recipient in Dr. Donald Walker's lab on "Interactions between skin bacteria and the snake fungal disease pathogen (*Ophidiomyces ophiodiicola*) across a nutrient gradient mimicking host skin chemistry". Ori won first place for poster presentations; photo below is taken with the president of the TN herp society (Dr. Josh Hall). Ori can also be seen presenting the poster to fellow scientist Aubree Hill.



Presenting at the Tennessee Herpetological Society Annual Conference, Alexis Hamous, MTSU MS Biology



MTSU undergrad Ori Bergman, right, presenting her research

Tennessee Herpetological Society president, Dr. Josh Hall, and Ori Bergman

BIOLOGY STUDENT TRAVEL

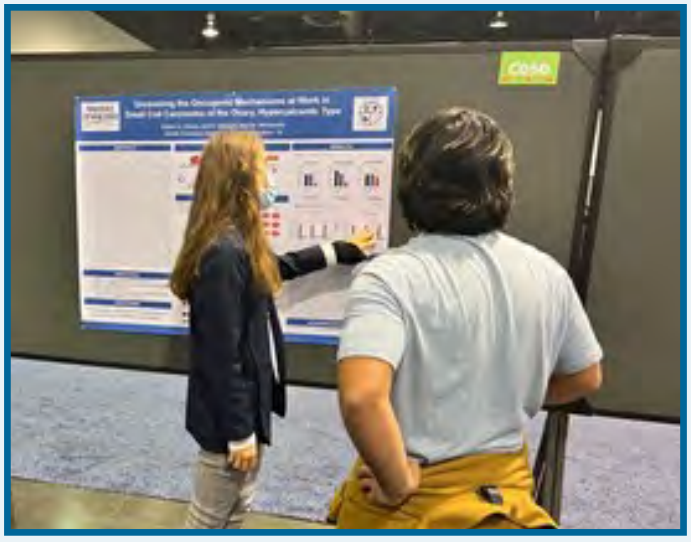
Kaylee Chisam

Annual Biomedical Research Conference for Minoritized Scientist
Anaheim, California
November 9—13, 2023

I attended the Annual Biomedical Research Conference for Minoritized Scientists (ABRCMS) from September 9-12th in Anaheim, California, and the experience is one I will remember forever. The conference allowed me to meet many individuals and hear many prestigious speakers. Among many other speakers, some of the most prestigious were Dr. Carolyn Bertozzi who won the 2022 Nobel Prize in chemistry, Dr. Maria Bottazzi who has developed low-cost, effective vaccines for international countries in need, Dr. Olajide Williams who developed Hip Hop Public Health (HHPH) to promote health equity in communities of color, and Dr. Mae Jemison who was the first person of color to travel to space. These speakers were outstanding, and I feel very lucky to have heard them.

Beyond these speakers, there were booths set up that allowed me to make connections with many universities and institutions. One of the most memorable experiences I had was the PhD students from St. Jude's research booth taking me and a few others out to dinner. I also made connections with many other institutions like Johns Hopkins, the National Cancer Institute, and the University of Michigan to name a few.

Finally, I presented the research I had conducted over the summer. My poster was entitled "Unraveling the Oncogenic Mechanisms at Work in Small Cell Carcinoma of the Ovary, Hypercalcemic Type (SCCOHT)" where I discussed the effects of MYC (an oncogene) and SWI/SNF subunits on SCCOHT. This was my first conference, but I really enjoyed presenting my research. Overall, the whole ABRCMS experience was amazing, driving me to want to continue my education in cancer research.



BIOLOGY STUDENT TRAVEL

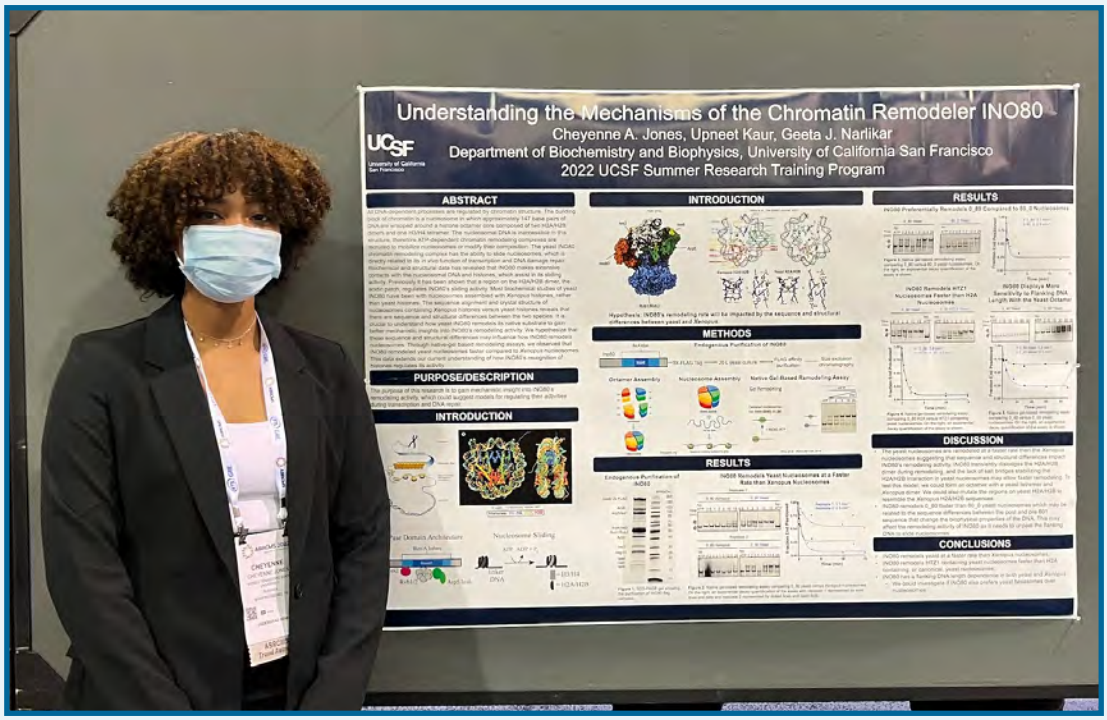
Cheyenne A. Jones

Annual Biomedical Research Conference for Minoritized Scientists

Anaheim, California

November 9—12, 2022

This past November I got the chance to attend the Annual Biomedical Research Conference for Minoritized Students (ABRCMS) in Anaheim. It was a wonderful experience to be able to present my research to other students with similar science backgrounds, as well as respected principal investigators at well rated schools. At this conference, I presented the research from my summer internship at the University of California San Francisco (UCSF) where I spent ten weeks studying the mechanisms of the chromatin remodeling complex INO80. This remodeler's function has been studied exclusively on *Xenopus* nucleosomes, so I was the first person to look at INO80 remodeling activity on its native substrate, yeast. I was able to make some personal connections and even reunite with a couple friends I made from my summer research internship. This environment motivated me to take the leap and apply for graduate school this cycle. I am very thankful that I was able to participate in this opportunity!



BIOLOGY STUDENT TRAVEL

Robert Dixon

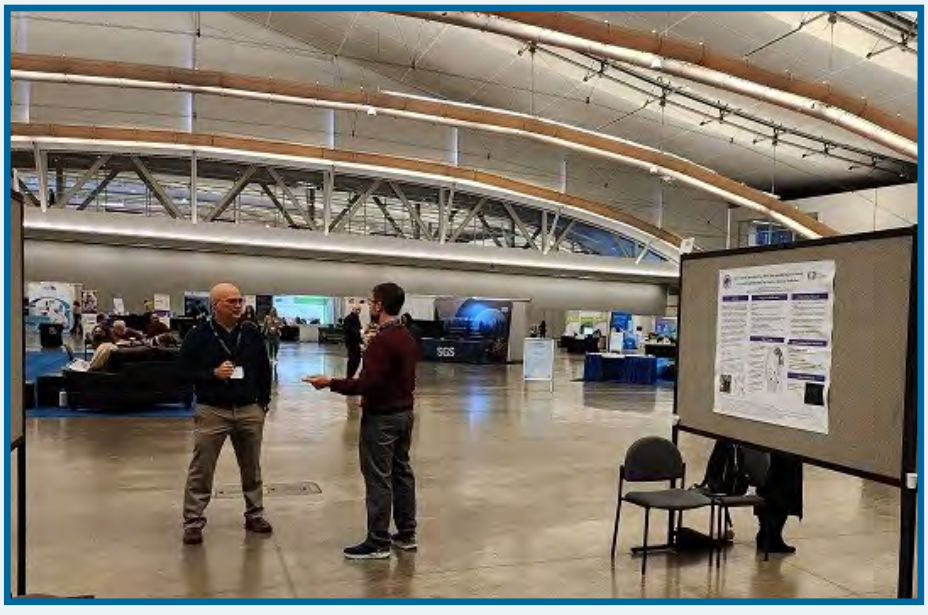
Society of Environmental Toxicology and Chemistry North America 43rd Annual Meeting

Pittsburgh, PA

November 13-17, 2022

The 43rd Annual North American Meeting of the Society of Environmental Toxicology and Chemistry (SETAC) was held in Pittsburgh, PA from November 13th through November 17th, 2022. This was the first in-person meeting since 2019 due to the COVID-19 pandemic, and it had a turnout of around 2,000 participants. This meeting is unique in that it has an approximately equal number of presenters and attendees from businesses and government agencies as well as from academia. I attended along with MTSU PhD student Jessica Landaverde, undergraduate student Sarah Kerr, faculty members Dr. Frank Bailey and Ryan Otter, and staff Kylie Moe and Alex Antonison. I presented my most recent data that I had gathered for my master's project on the effects of the pharmaceutical pollutant atorvastatin (Lipitor) on molting in crayfish, and my poster placed 1st in the student poster presentation competition.

Overall, this was a very rewarding experience that allowed me to interact with many scientists from different sectors and really put my future career plans into perspective. The student-mentor dinner was by far my favorite experience at the meeting since I was able to talk to two industrial scientists, the ecotoxicologist for the state of West Virginia DEP, and the chair of the department of environmental sciences at LSU. With these people, I was able to ask questions about their careers and what sort of things I should be doing to prepare myself today for a job in their respective fields. This was my third conference overall, but my first major society meeting. After mostly online interactions these last two years, it was great to interact with people face-to-face once again, and I look forward to attending the meeting next year in Louisville, KY.



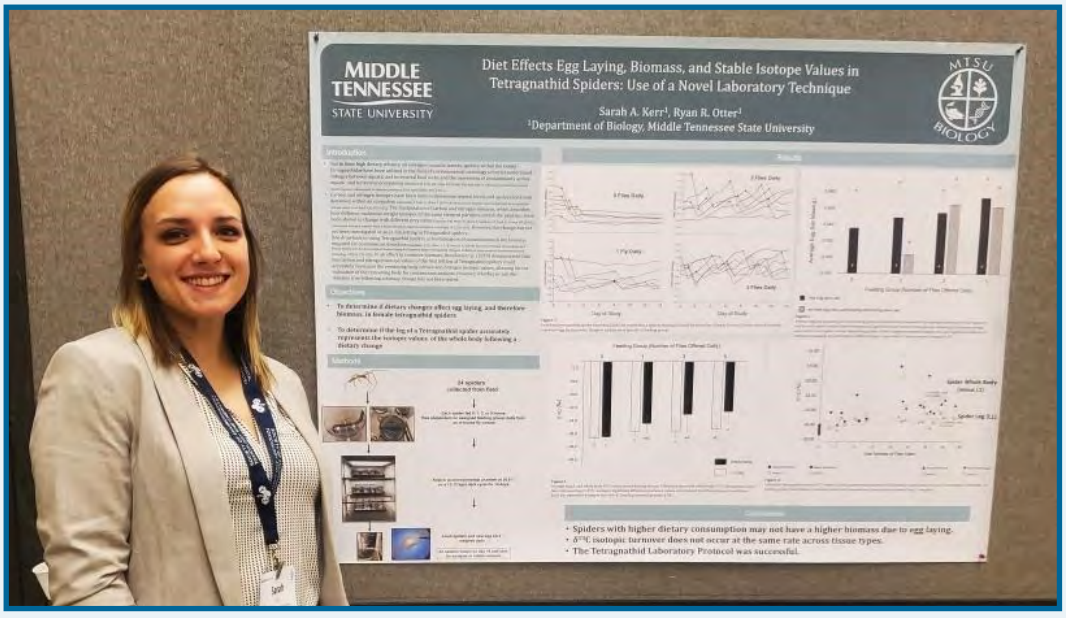
BIOLOGY STUDENT TRAVEL

Sarah Kerr

Society of Environmental Toxicology and Chemistry
Pittsburgh, PA
November 13-17, 2022

This past year, our lab team had the incredible opportunity to attend the 43rd annual meeting of the Society of Environmental Toxicology and Chemistry in Pittsburgh, PA. This society has multiple sectors that hold events multiple times throughout the year and is a wonderful resource for students interested in the field of environmental toxicology as it provides a rich networking ground. This was my very first in-person conference, where I presented a poster on the work we had done during the COVID-19 pandemic. This particular project was looking at dietary influence on egg laying, biomass, and stable isotopes in a type of spider that is used as a bioindicator of contaminants in freshwater water ways. Having the opportunity to present this work at the conference allowed me to strengthen my ability to articulate my science well to others in a setting that was designed to do just that. I learned how to tell a story rather than simply stating facts.

One of the greatest things I took away from the conference was not only becoming a better storyteller, but all of the connections I made doing it. I connected with so many people in so many different sectors that have given me so much insight on graduate school and what research really is. I still talk with many of them today and plan to keep in touch over the coming years. They have also connected me with even more people! The conference was everything I had hoped it would be and more. It was a life changing experience that I will never forget.



BIOLOGY STUDENT TRAVEL

Marcus Luciano

American Academy of Forensic Sciences
Orlando, Florida
February 13– 18, 2023

One of the main reasons I went to the American Academy of Forensic Sciences (AAFS) this year was to see and support the research I have been helping with be while it was being presented there. In this research, Dr. Yangseung Jeong introduced a new concept, Digital Bone Loss (DBL), for any researchers who are using CT scan data. He suggested that DBL can be used for forensic anthropological analyses as a proxy of bone mineral density. To demonstrate its utility, new methods were generated for sex and age estimation using DBL.

There are a wide variety of lectures you can see and listen to at AAFS and there was no problem finding something interesting to go see. For example, there was an incredible lecture series on the Charles Lindbergh kidnapping. But that is just one of the many topics that are covered there. Some of the general sections include engineering, biology/pathology, toxicology, nursing, etc.

Whilst there I was able to reconnect with a forensic pathologist that I worked with over the summer during my internship and support her research as well. This conference also presented itself as a networking opportunity. This is my last semester here at MTSU and AAFS was the perfect event to talk to potential employers and various professors or admissions staff from a variety of graduate schools. Overall, it was a wonderful experience, and I would like to continue trying to go once I leave MTSU and am in the workforce or at a graduate school.

Attending the 2023 AAFS meeting: Standing in the back row, from left, are Dr. Kelly Sauerwein (NIST), Dr. Tiffany Saul (MTSU faculty), Audrey Lauerhass (MTSU undergrad), Emma Lloyd (MTSU undergrad), Shannon Velasquez (MTSU grad student), Dr. Frank Bailey (Director, Forensic Science Program); kneeling in the front row are MTSU undergrads Chris Rickman, Nathan Janes, and Marcus Luciano

BIOLOGY STUDENT TRAVEL

Miranda Fain

American Academy of Forensic Sciences

Orlando, FL

February 15-18, 2023

I, Miranda Fain, was accepted to go to the American Academy of Forensic Sciences in Orlando, Florida on February 15th to 18th. I was given the opportunity to present research that had been completed in the Spring of 2022. This research was to identify the scavengers that reside in Murfreesboro, Tennessee, and to answer some questions about what time of day do scavengers like to be active, when do scavengers notice and start eating bodies in outdoor settings, and how will scavengers affect decomposition. The goal of this research is and was to get a better understanding of how scavengers could affect outdoor crime scenes and how should forensic investigators be better prepared for that situation. The experiment involved leaving two goat carcasses and a deer carcass at the MOFF (MTSU Outdoor Forensic Facility) in a screened in area to keep anything from dragging the bodies off into the wild and to keep the scavengers under the motion activated camera that sat above the area.

For my presentation, I was able to present a poster. The poster contained all the results and pictures of the scavengers actively working on the carcasses laid out for them. I was able to talk about the three main scavengers, how the decomposition was affected differently based on how each scavenger ate off the body, and about how this research allowed for questions to be answered and new ones to be made. Those new questions led to new research that was just completed for MTSU's Scholar's week. However, this research also showed that there is a ton of research that is needed to be done in scavengers and how they can affect crimes scenes in different ways.

During this conference, I learned how to better explain processes and in general how to talk to people in a professional setting, how to ask questions about why they did the research they did, and how different questions can be answered the same way. In one presentation, the speaker was talking about the importance of opossum research, the way they scavenge, how they travel to different places, if they would take anything from crime scenes, etc. This talk helped me think of how my professor, Dr. Yangseung Jeong, and I can think outside the box to look at different ways to work with the different scavengers that we are seeing with ongoing research at the field. I also learned that if we were to try to do anything with discovering the soil pH around the grounds of the field, it would be a long process of mixing dirt, analyzing it, and collecting more. The last and probably most important things that I learned about was that you should never assume the outcome of any experiment no matter how many times the results had been the same, and to make sure to always wear gloves to not contaminate anything you are working with.

Miranda Fain and Dr. Yangseung Jeong

BIOLOGY STUDENT TRAVEL

Shannon Velasquez

American Academy of Forensic Sciences

Orlando, Florida

February 13– 18, 2023

Biology M.S. Student in Dr. Yangseung Jeong's Lab

In February of 2023, I attended the American Academy of Forensic Sciences (AAFS) Conference with several other students and some professors from the Department of Biology and from the Forensic Science Program. Dr. Yangseung Jeong's abstract, entitled *Utility of digital bone loss (DBL) for biological profile reconstruction in forensic anthropology*, was selected for presentation. It had many student co-authors and researchers including myself, Leslie Gonzalez, Casey Tomlin, and Marcus Luciano as well as Dr. Jeong's South Korean colleague, Eun Jin Woo. In Dr Jeong's lab, we have been researching methodologies of using data from CT scans to sort commingled remains through pair matching. This has led to research in other applications of the data to build biological profiles. When CT scans are converted to 3D images, thresholds are set to isolate bone from any soft tissue or surrounding boxes it was scanned in. Depending on the density of the bone, the threshold set to segment the bone can lead to digital bone loss, which correlates to the age and sex of the individual.

The conference was packed with dozens of simultaneous short sessions, often just 15-minutes in length. Presentations highlighted the leading research in the field, all the way from toxicology and chemistry to anthropology, taphonomy, and odontology. I learned about how body fat affects decomposition, how personal effects are used in conjunction with biological analysis to identify migrants lost in New Mexico deserts, and how forensic anthropology work has led to human rights research in Detroit. But perhaps the most valuable experience for me was connecting with an employee of the Defense POW/MIA Accounting Agency (DPAA) at a poster presentation. Her research in sorting commingled remains in children had linkages to mine in using CT scans for pair matching. We discussed ways that our research could help each other, and in turn, the families that will have their loved ones' remains returned to them.

BIOLOGY STUDENT TRAVEL

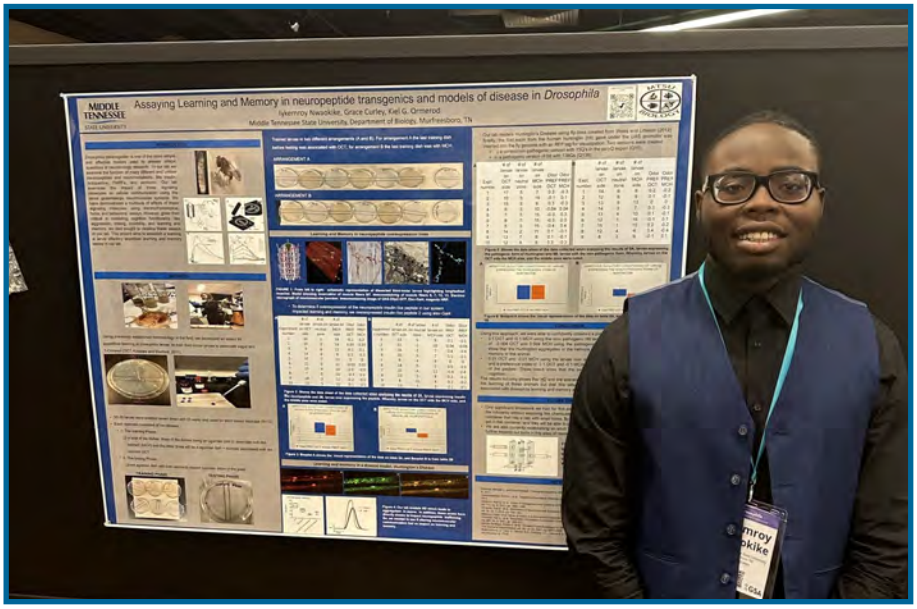
Iykemroy Ikemefuna

64th Annual Drosophila Research Conference

Chicago, Illinois

March 1—5, 2023

This past March I was invited to present the findings from my research project entitled "Assaying Learning and Memory in neuropeptide transgenics and models of disease in *Drosophila"* at an international conference held in Chicago, the 64th annual Drosophila Research Conference. I began working in Dr. Ormerod's lab back in January of 2022 after taking his physiology class. Dr. Ormerod's lab investigates the molecular and cellular mechanisms underlying cellular communication. My project introduced a novel area of research into the lab investigating how the genetic manipulations we use to explore cellular communication alter bigger picture behavioral processes like Learning and Memory. My project not only established this new technique in the lab, but we also presented novel findings demonstrating the impacts of overexpressing neuropeptides, and the impacts of a disease we study in the lab, Huntington's Disease, have on Learning and Memory. In addition to presenting my research, I was also afforded the opportunity to attend several talks on ground-breaking research on different topics using fruit flies as model organism. I am also happy to announce that I recently graduated from the Biology department at MTSU and aspire to head off to Medical School!



BIOLOGY STUDENT TRAVEL

Tadros Hana

64th Annual Drosophila Research Conference

Chicago, Illinois

March 1—5, 2023

Recently I attended the 64th annual Drosophila Research Conference, an international conference held in the past March in Chicago, IL. Here I presented on "Characterization of the cellular progression of Huntingtin-Aggregates and the Associated Physiological Impacts", work that I did in the Ormerod lab here at MTSU. The conference was an incredibly unique and valuable experience for me, and my development/training as both a student and researcher. I not only got to interact and present my work to some leading experts as well as other students like me, I also got to interact with hundreds of other presenters, ask them questions and develop new relationships and ideas. This experience also exposed me to so many novel fields, questions, and topics I had very little exposure to previously. I hope to take this experience and continue to grow academically and professionally. I will be continuing my work in the Ormerod lab on Huntington's Disease research during the upcoming year while I finish up my undergraduate degree, then hopefully pursue graduate studies. I want to thank Dr. Ormerod for his mentorship, and the biology Department at MTSU for the opportunity to present.

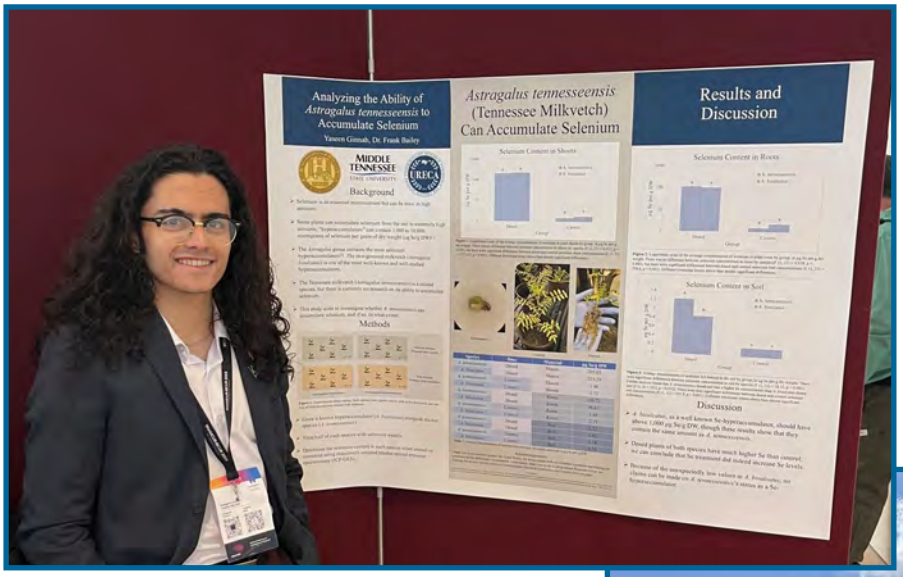
Iykemroy Ikemefuna, Tadros Hana, Dr. Kiel Ormerod

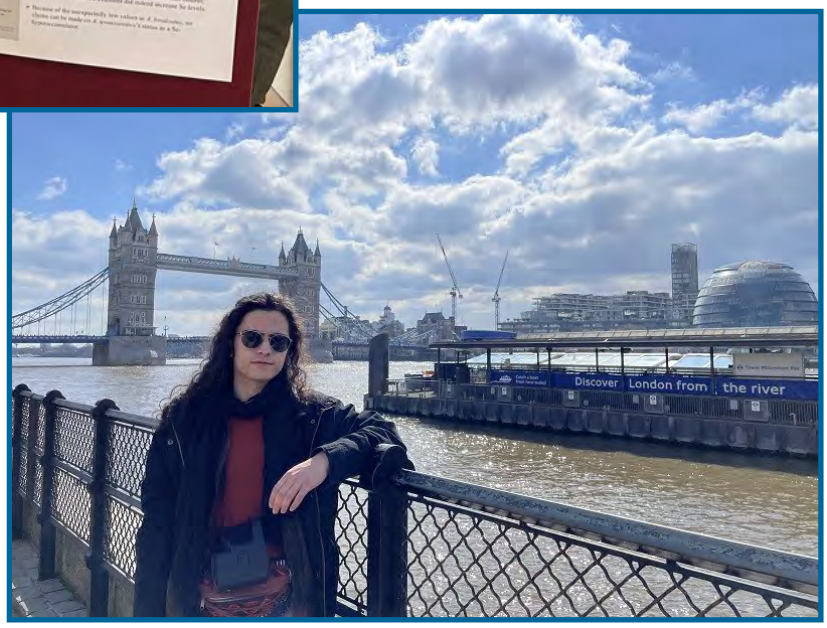
BIOLOGY STUDENT TRAVEL

Yaseen Ginnab

WorldCUR-BCUR 2023
University of Warwick in Coventry, England
April 3—6, 2023

I attended WorldCUR/BCUR to present my Honors Undergraduate Thesis titled "Analyzing the Ability of *Astragalus tennesseensis* to Accumulate Selenium." We first spent two days in London, then traveled to Coventry to stay at the University of Warwick for the duration of the conference. London was an amazing experience, it's a beautiful city full of very diverse people and so many things to see. Coventry was also very enjoyable. We didn't spend time in the city itself, but the Warwick campus was amazing. On the days I wasn't presenting I was able to listen to so many interesting presentations and explore the beautiful campus. I enjoyed it so much that I started looking at graduate programs there and spoke with the admissions office. I'm definitely planning to apply! The Department of Biology helped me gain an incredibly valuable international experience with their funding, and I'm very thankful!





BIOLOGY STUDENT TRAVEL

Jesse Scobee

WorldCUR-BCUR 2023
University of Warwick in Coventry, England
April 3—6, 2023

I'm writing to give a brief report on my experience representing MTSU at WCUR-BCUR 2023. This was easily one of the best experiences I've had in my college career. The conferences had almost 700 delegates from 36 different countries, and getting to connect and exchange ideas with researchers from such a wide group was invaluable. There were many spoken sessions each day and the vast majority of the presentations were extremely well executed and interesting. One that stood out to me was a researcher from the University of Sussex describing his research into protein aggregation in Alzheimer's disease.

A small group of us had the privilege of meeting Dr. AC Nelson, the brother of MTSU's own Dr. David Nelson. He gave us a tour of his lab and the science building at Warwick. Small world.

I am extremely grateful for the funding I received from the biology department; this is an experience that I will never forget.

Leslie Gonzales, Ross Sibley, Yaseen Ginnab, Jesse Scobee, Janna Abou-Rahma, Marzea Akter, Dr. Jamie Burriss—URECA Program Manager

Back row: Yaseen Ginnab, Leslie Gonzales, Brooke Busbee, Hunter Brady, Ross Sibley. Front row: Marzea Akter, Janna Abou-Rahma, Dr. Jamie Burriss, Jesse Scobee

Hunter Brady, Ross Sibley, Dr. AC Nelson, Jesse Scobee (back row), Janna Abou-Rahma, Yaseen Ginnab

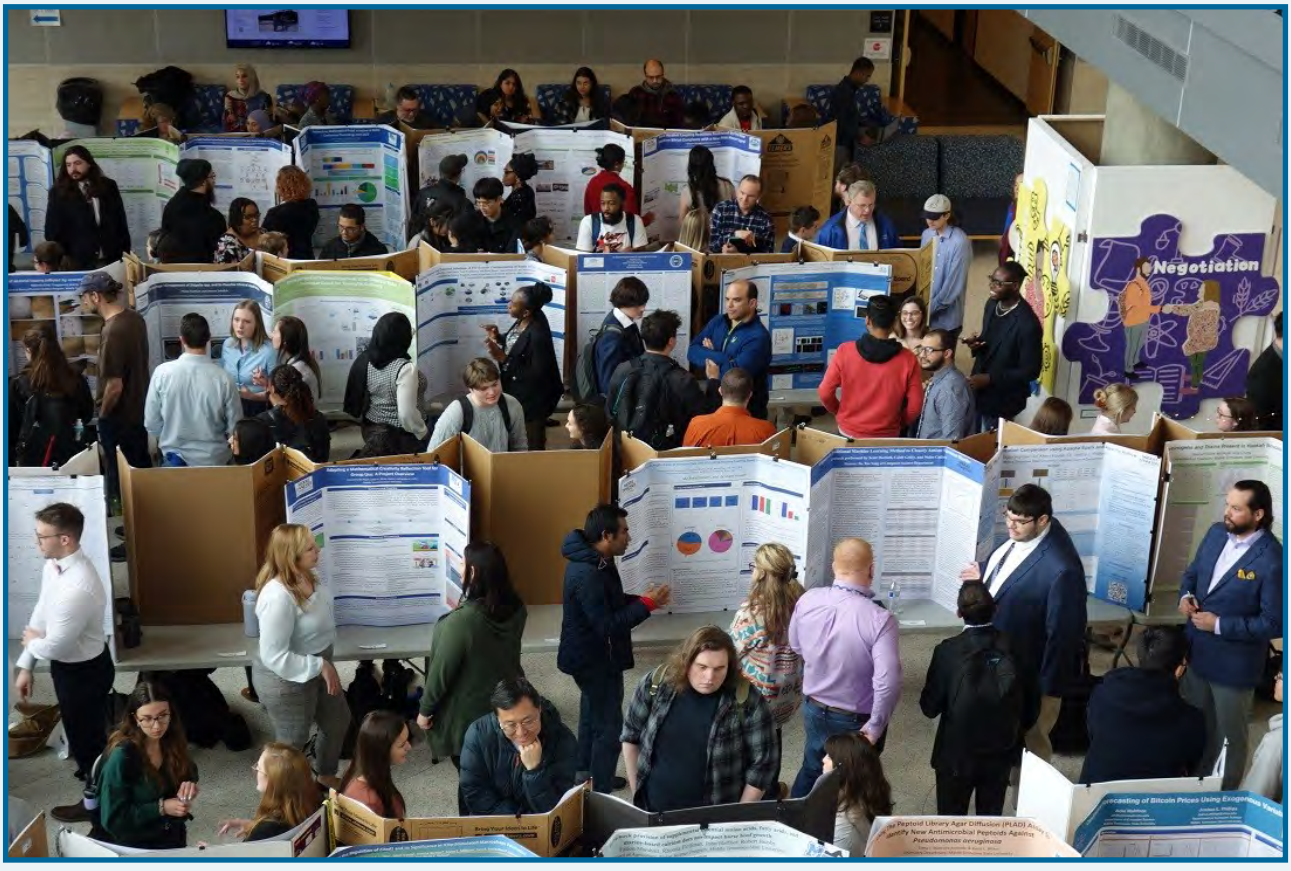
Department Graphic Shirts and More

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
Drawstring backpack:	$5
Stadium Cups:	$1
Coffee Mugs:	$5

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

or by email at Biology@mtsu.edu.



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 four 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, Radiation Biology, Genetics lectures and labs, Ecology labs, Biology Instruction Internship, 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; Ph.D., 2000, University of Kentucky. Teaching: Exploring Life lecture, Ecology labs, Biology Instruction Internship, 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

Adjunct Faculty

Moses Prabu, B.S., 1991; M.S., 1993, The American College; Ph.D., 1998 Indian Institute of Science. Teaching: Radiation Biology

BioUpdate

Dennis Mullen, department chair (Dennis.Mullen@mtsu..edu)
Produced by MTSU Department of Biology
Key contributors to this issue of *BioUpdate*:
Dennis Mullen, Matthew Klukowski, Rebecca Seipelt-Thiemann

2022-23 Graduate Teaching Assistants

For the 2022-2023 academic year, the department is providing support to 27 M.S.- level and 10 Ph.D.- level graduate students who serve as graduate teaching assistants (GTAs). Sixteen of these students have received undergraduate degrees from colleges and universities other than MTSU. Ten hold baccalaureate degrees in subjects other than biology (agriculture, animal science, biochemistry, biotechnology, forensic science, liberal arts, microbiology, wildlife and fisheries science.) 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

Akenyemi Akindutire, B.S., Biochemistry, 2016, Bells University of Technology

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

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

Leigh Bumpous, B.S., Biology, 2017, Middle Tennessee State University

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

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

Robert Dixon, B.S., Biology, 2020, Middle Tennessee State University

McKenna Hunt Edwards, B.S., Biology, 2019, University of Alabama

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

Sarah Garcia, B.S., Biology, 2020, Middle Tennessee State University

Ashley Gereben, B.S., Biology, 2018, Middle Tennessee State University

Delaney Therrien Gilley, B.S., Biology, 2020, Middle Tennessee State University

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

Alexis Hamous-Miller, B.S., Animal Science, 2017, Oklahoma State University

Shane Hardin, B.S., Wildlife and Fisheries Science, 2020, University of Tennessee

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

Cameron Oldham, B.S., Biology, 2019, Middle Tennessee State University

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

2022-23 Graduate Teaching Assistants

M.S. Biology Graduate Teaching Assistants

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

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

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

Henry Whittemore, B.A., Liberal Arts, 2018, St. Johns College

Kaela Wolkiewicz, B.S., Biology, 2022, Middle Tennessee State University

Carl Womack, B.S., Biology, 2020, Middle Tennessee State University

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

Ph.D. Graduate Teaching Assistants

Molecular Biosciences Program

Daniel Bryant, B.S., Biology, 2014, Middle Tennessee State University

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

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

Destaalem Kidane, B.S., Biology, 2009; M.S., Biology, 2012, Georgia College and State University

Aarthi Subramani, B.T., Biotechnology, 2016, Anna University

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

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

Derek Wiggins, B.S., Biology, 2007; M.S., Biology, 2010, University of Alabama

Midya Yarwais, B.S., Biology, 2018, Belmont University; M.S., 2019, Lipscomb University

Math and Science Education Program

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

Theses and Dissertations Completed 2022-2023

Master's Theses

Summer 2022

Jeremy E. Smith, 2022. Polyp Predicament: 2b-RAD reveals hidden dissimilarity in genus Zoanthus (Anthozoa: Hexacorallia)
(Cole Easson, Jeff Leblond, Sarah Bergemann, Rebecca Seipelt-Thiemann—thesis committee)

Clinton R. Warren, 2022. Bold or boxed?: Testing for morphological and physiological differences between eastern box turtles (*Terrapene carolina*) with individual variation in boldness.
(Matthew Klukowski, Amy Jetton, Vincent Cobb—thesis committee)

Fall 2022

Leigh Bumpous, 2022. Determining the impact of WDR5 on the ability of N-MYC to bind chromatin.
(April Weissmiller, Jason Jessen, J. Brian Robertson-thesis committee)

Sarah Garcia, 2022. SNF5/SMARCB1 Perturbation Results in Alternative Splicing for Specific Genes Rather Than Global Genomic Splicing Changes
(Rebecca Seipelt-Thiemann, April Weissmiller, Mary Farone-thesis committee)

Delaney Gilley, 2022. Evolution of Cranial Morphology and the Functional Consequences of Echolocation in Bats
(Jessica Arbour, Brian Miller, Sarah Bergemann-thesis committee)

Alexis Hamous, 2022. Effect of Pregnancy on Body Temperature Regulation and Habitat Use of Northern Watersnakes (*Nerodia sipedon*) in Middle Tennessee.
(Vince Cobb, Matthew Klukowski, Donald Walker-thesis committee)

Davia Watkins, 2022. Using Evolutionary Relationships of the *Poly-ADP-ribose Polymerase* (*PARP*) Gene Family to Identify Nearest Relative to the Undefined PARPs
(Rebecca Seipelt-Thiemann, J. Brian Robertson, David Nelson-thesis committee)

Spring 2023

McKenna Edwards, 2023. Core planar cell polarity function in migrating gastrula cells – analysis of a novel zebrafish *prickle1a* mutant line
(Jason Jessen, April Weissmiller, Brian Robertson-thesis committee)

Theses and Dissertations Completed 2022-2023

Doctoral Dissertations

Fall 2022

Aarthi Subramani, 2022. Antifungal Assessments, Chemogenomic and Transcriptomic Analyses, and Structure-Activity Relationships of Bioactive Aurone Compounds
(Mary B. Farone, Scott T. Handy, Anthony L. Farone, Rebecca L. Seipelt-Thiemann, Paul C. Kline-dissertation committee)

Spring 2023

Melissa Pompilius, 2023. Investigating the Ecology and Thermal Biology of the Exotic Cladoceran Daphnia Lumholtzi
(Frank Bailey, Robert Fischer, Jeff Leblond, Anthony Newsome, Matthew Gilg-dissertation committee)

In Memoriam

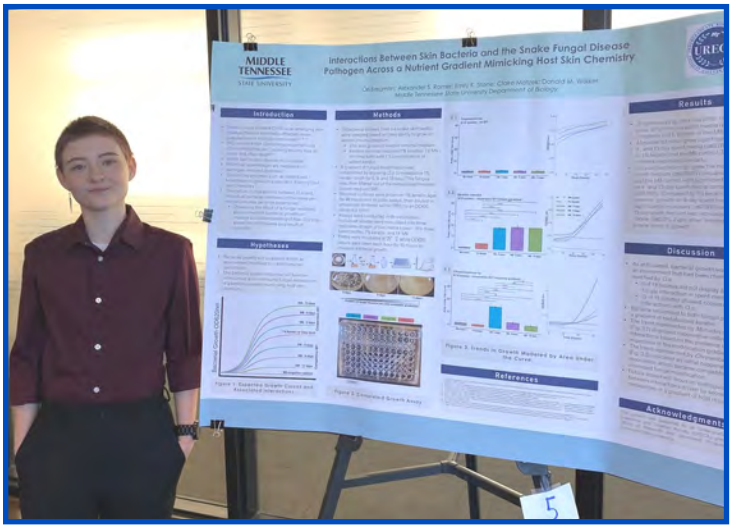
I am sad to report that Dr. Sarah Barlow, Professor Emerita, passed away on October 4, 2022. Dr. Barlow was a lifelong Blue Raider and a longtime member of the biology faculty. She earned her BS in Biology in 1956 (when we were called Middle Tennessee State College) and a MA in Natural Science in 1963. Sarah worked for several years as a high school teacher and adjunct professor in our department before joining the department full time in 1979. She went on to earn an Ed.D. from Peabody College at Vanderbilt University in 1990 (while teaching full-time MTSU). Sarah taught BIOL 100/BIOL 1030 classes,

played a huge role in developing engaging labs for those classes and coordinated the GTA's for those labs for many years. Through this she was able to share her love for teaching and learning with graduate students that had no formal training in education. She developed the Honors section of BIOL 1030/1031, which she taught until she retired in 2007. Sarah was one of the first biology faculty invested in teaching through technology and assisted other faculty during an internship through what was formerly known as the Faculty Instructional Technology Center. Creative and clever, she worked campus-wide with other faculty in implementing the use of technology in their classes. Sarah stayed engaged with the department after her retirement and taught BIOL 1030 classes as an adjunct professor for many years. Sarah was a passionate teacher, strong advocate for the students and a wonderful colleague. We gathered to reminisce and celebrate her in November in the Science Building Atrium to a standing-room only crowd. She was warm, welcoming, wise, witty, and a valuable resource for young faculty (such as me) that were starting their careers in this department.

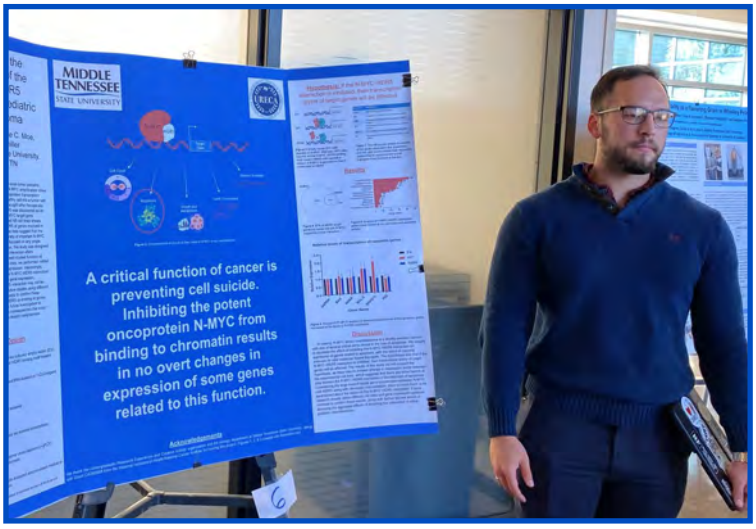
Rest in Peace Sarah.

MTSU Undergraduate Research Center

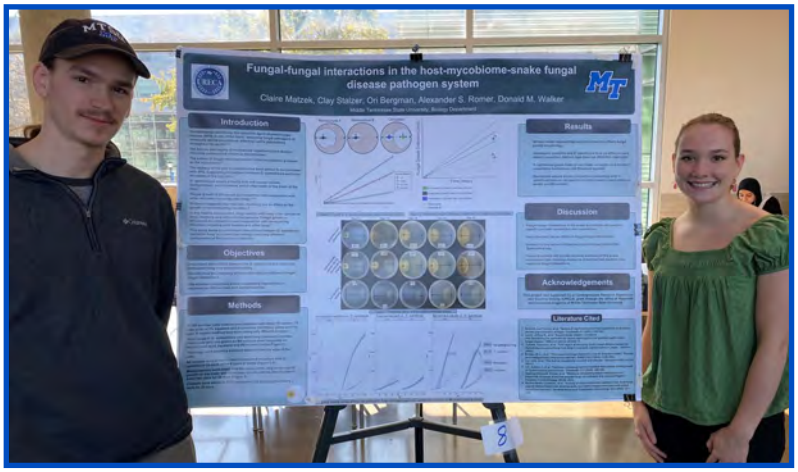
The Fall Research Open House, held 11/3/2022, was an informal poster session that showcased a sampling of current undergraduate student research and creative projects at MTSU. All students, particularly new students and transfer students, were invited to attend. This event was an awesome opportunity 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. And, FREE lunch!



Ori Bergman, Biology; **Dr. Donald Walker** (faculty sponsor) Biology; "Interactions Between Skin Bacteria and the Snake Fungal Disease Pathogen (Ophidiomyces ophiodiicola) Across a Nutrient Gradient Mimicking Host Skin Chemistry"



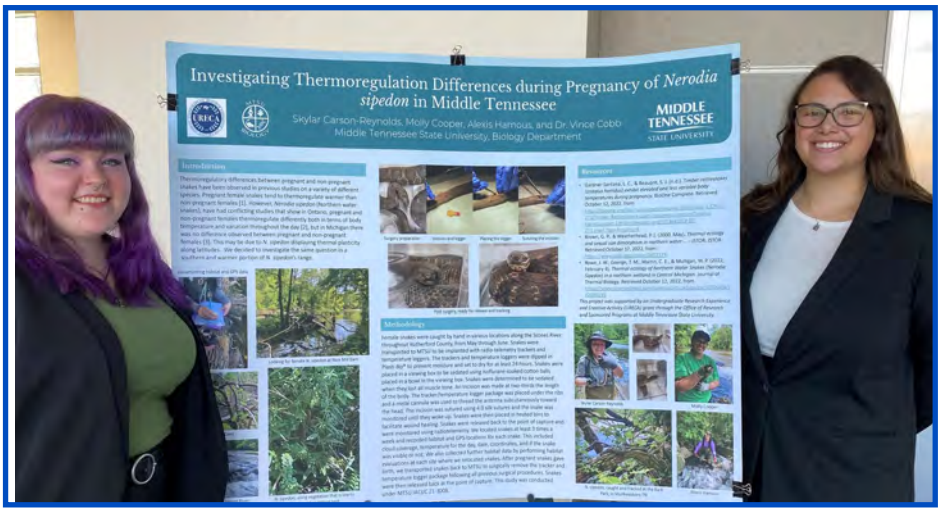
Jesse D. Scobee, Biology; **Dr. April Weissmiller** (faculty sponsor) Biology; "Investigating the Significance of N-MYC-WDR5 Interaction in Pediatric Neuroblastoma"



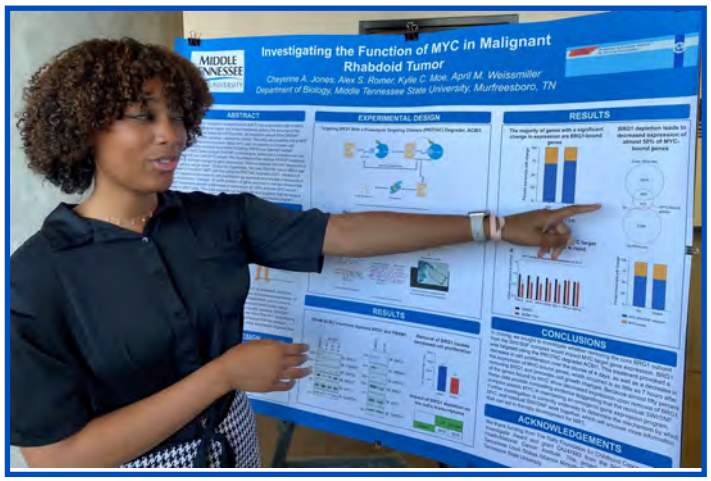
Claire Matzek & Clay Stalzer, Biology; **Dr. Donald Walker** (faculty sponsor) Biology; "Fungal-fungal interactions in the host-mycobiome-snake fungal disease pathogen system"

MTSU Undergraduate Research Center

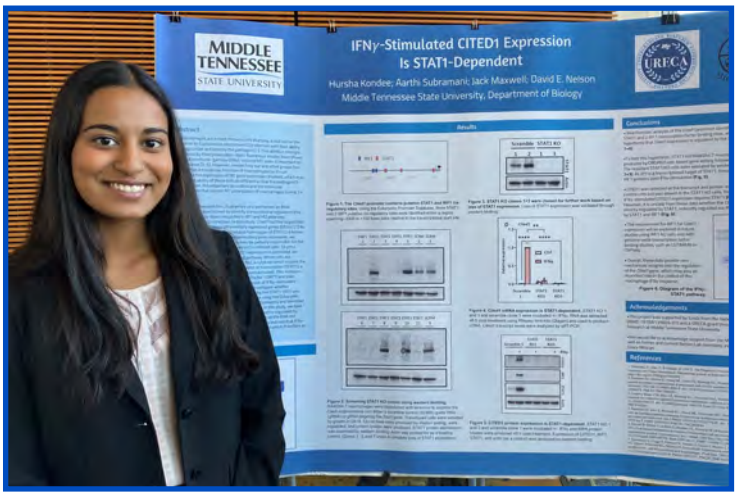
The 2022 Fall Research Open House



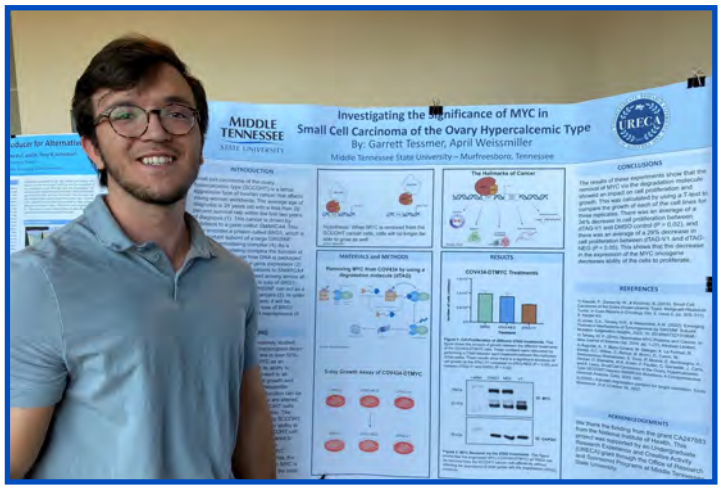
Skylar Carson-Reynolds & Molly Cooper, Biology; **Dr. Vincent Cobb** (faculty sponsor) Biology; "Body Temperature in Gravid and Non-Gravid Female Water Snakes (Nerodia Sipedon)"



Cheyenne Jones, Biology, **Dr. April Weissmiller** (faculty sponsor) Biology; "Investigating the Function of MYC in Malignant Rhabdoid Tumor"



Hursha Kondee, Biology; **Dr. David E. Nelson** (faculty sponsor) Biology; "Interferon-gamma Stimulated CITED1 Expression is STAT1dependent"



Garrett Tessmer, Biology; **Dr. April Weissmiller** (faculty sponsor) Biology; "Investigating the Significance of MYC in Small Cell Carcinoma of the Ovary Hypercalcemic Type *"

Scholars Week Highlights Faculty and Student Research

Scholars Week March 20—24, 2023

Middle Tennessee State University held the 17th Annual Scholars Week March 20-24, 2023.

Scholars Week is a week long tradition during which MTSU's academic colleges celebrate scholarship, research, and creative activity through a variety of events and activities. The department presented over 42 posters between the CBAS poster day in the SCI atrium and the university-wide poster session. Authors of these posters included 15 faculty members, 12 graduate students, and 37 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.

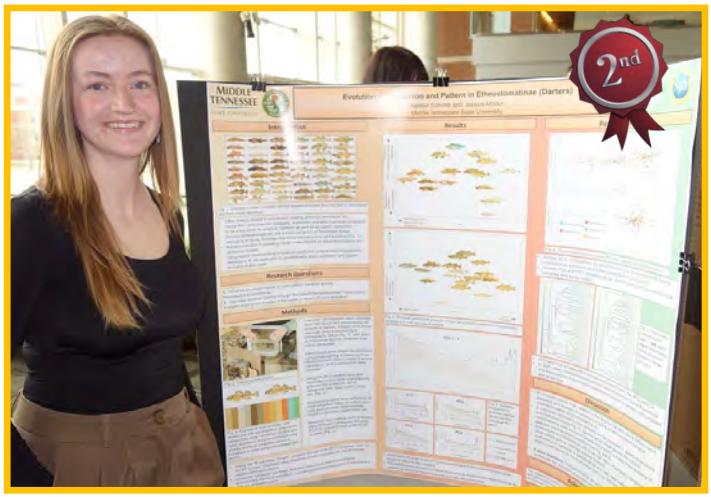
Congratulations to all authors for a job well done!

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

The following are posters from the Department of Biology.

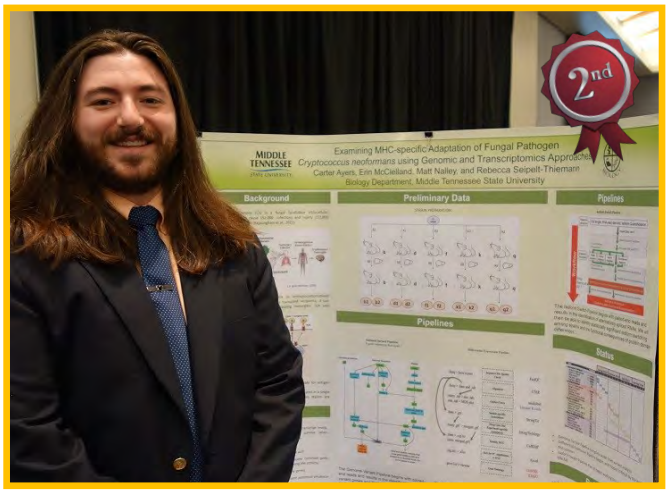
Congratulations to the CBAS 2023 Poster Day Competition and the University-Wide Scholars Week authors and their faculty mentors!

CBAS 2023 Poster Day Competition



Natalie Schroth, MS Biology; **Dr. Jessica Arbour** (faculty sponsor) Biology; "Evolution of Coloration and Pattern in Etheostomatinae (Darters) "

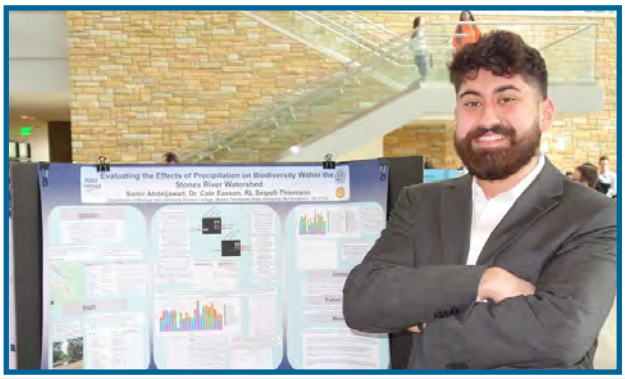
University-Wide Scholars Week Awards



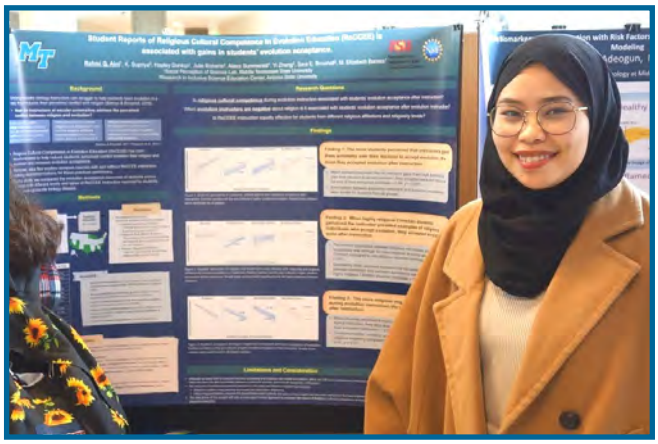
Carter Ayers, MS Biology, Erin McClelland, Matt Nalley; Faculty Mentor: **Dr. Rebecca Seipelt-Thiemann**; "Examining MHC-specific Adaptation of Fungal Pathogen _Cryptococcus neoformans_ using Genomic and Transcriptomics Approaches"

SCHOLARS WEEK 2023

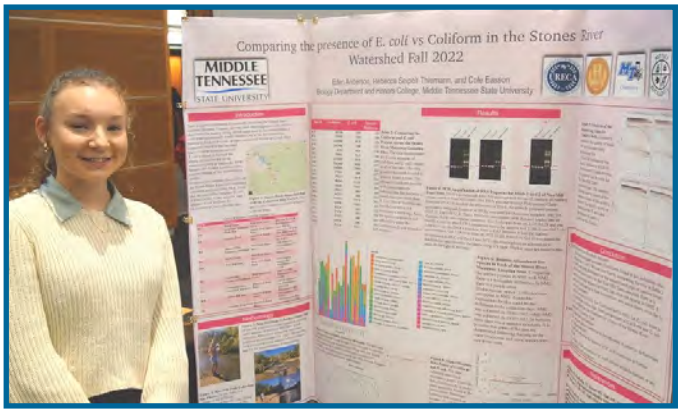
Scholars Week March 21—24, 2023



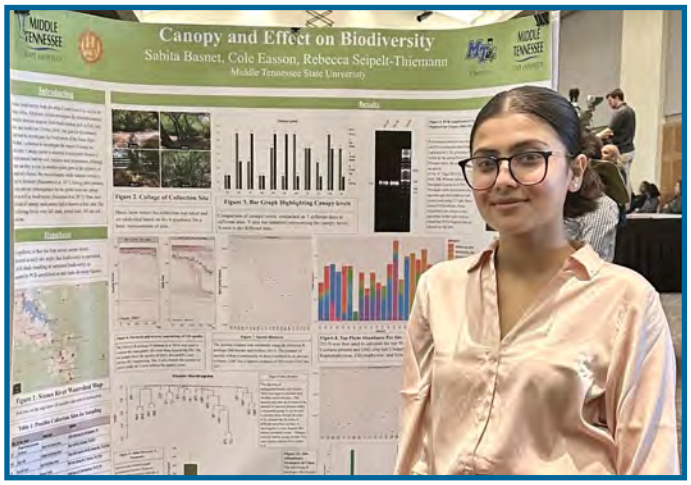
Samir I. Abdeljawad, BS Biology; **Dr. Rebecca Seipelt-Thiemann** (faculty sponsor) Biology; "Evaluating the Effects of Precipitation on Biodiversity Within the Stones River Watershed"



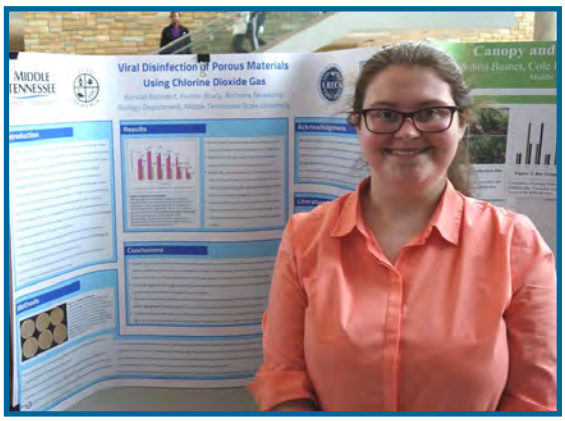
Rahmi Q. Aini, MSE, PhD; **Dr. Elizabeth Barnes** (faculty sponsor) Biology; "Student Reports of Religious Cultural Competence in Evolution Education (ReCCEE) is Associated with Gains in Students' Evolution Acceptance"



Eden Anderson, BS Biochem; Cole Easson; Faculty Mentor: **Dr. Rebecca Seipelt-Thiemann,** Biology; " _E. coli_ and Biodiversity in the Stones River Watershed"



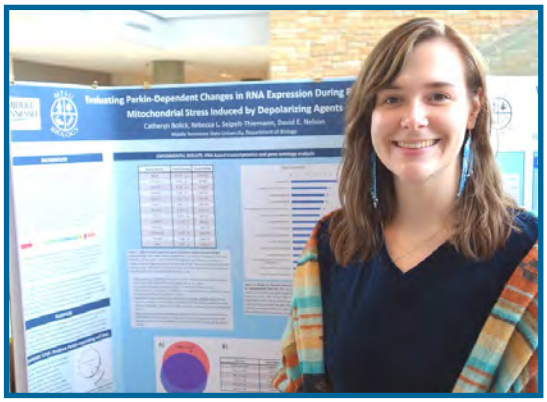
Sabita Basnet, Biology; **Dr. Rebecca Seipelt-Thiemann** (faculty sponsor) Biology; "Biodiversity in the Stones River Watershed is Positively Associated with Canopy"



Kendall L. Benedict, BS Biology; Hunter Brady, BS Biology; **Dr. Anthony Newsome** (faculty sponsor) Biology; "Viral Disinfection of Porous Materials Using Chlorine Dioxide Gas"

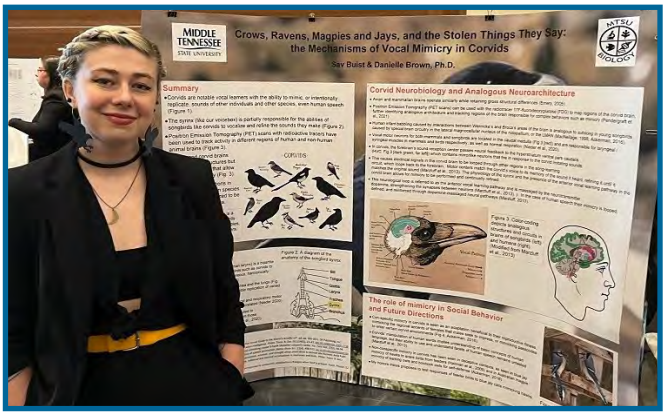
SCHOLARS WEEK 2023

Scholars Week March 21—24, 2023



Catheryn A. Bolick, BS Biology; **Dr. David Nelson** (faculty sponsor) Biology; "Evaluating Parkin-Dependent Changes in RNA Expression During Periods of Mitochondrial Stress Induced by Depolarizing Agents"

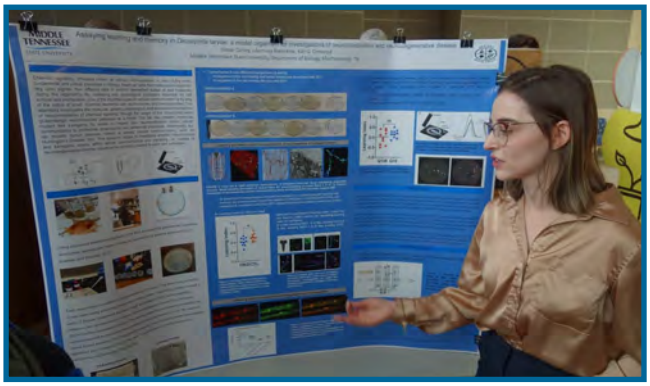
Stephen A. Borders, MS Biology, **Ann M. Petty**, BS Biology; **Dr. Mary Farone** (faculty sponsor) Biology; "Invasion of Phagocytic and Non-Phagocytic Cells by 'Candidatus Berkella cookevillensis'"



Sav Buist, BS Biology; **Dr. Danielle Brown** (faculty sponsor) Biology; "Crows, Ravens, Magpies, and Jays, and the Stolen Things They Say: The Mechanisms of Vocal Mimicry in Corvids"

Sarah A. Clark, MS Biology; **Dr. Jessica Arbour** (faculty sponsor) Biology; "Skull Shape Diversity Established Early in Etheostomatinae"

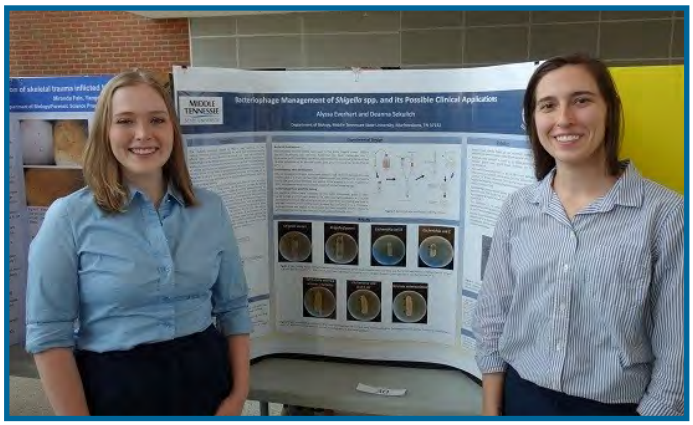
Katie A. Coscia, MSE, PhD; **Dr. Elizabeth Barnes** (faculty sponsor) Biology; "Perceptions of Conflict Between Religion and Evolution in Undergraduate Biology Students"



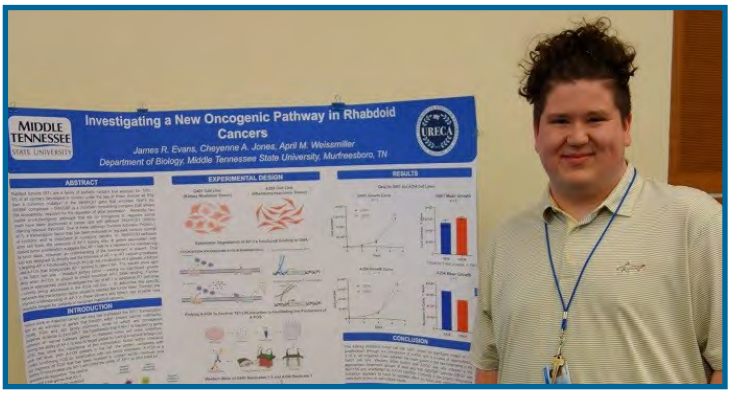
Grace L. Curley, BS Biology; **Dr. Kiel G. Ormerod** (faculty sponsor) Biology; "Assaying Learning and Memory in Drosophila Larvae: a Model Organism for Investigations of Neuromodulation and Neurodegenerative Disease"

Scholars Week March 21—24, 2023

Valerie Davis, BS Biology; **Dr. Jessica Arbour** (faculty sponsor) Biology; "Mapping an Unseen Landscape: An Analysis of Scale Texture in Two Darter Fishes"

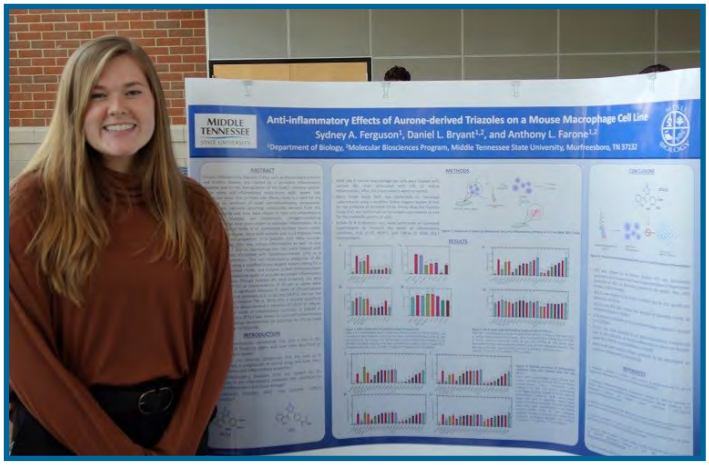


Alyssa D. Everhart, MS Biology (right), **Deanna C. Sekulich**, BS Biology; **Dr. Stephen Wright** (faculty sponsor) Biology; "Bacteriophage Management of Shigella spp. and its Possible Clinical Applications"



James Evans, BS Biology; **Cheyenne Jones**, BS Biology; Faculty Mentor: **Dr. April Weissmiller**, Biology; "Investigating a New Oncogenic Pathway in Rhabdoid Cancers"

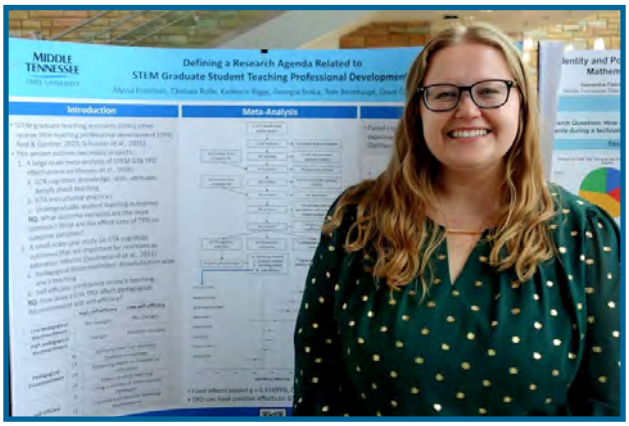
Miranda D. Fain, BS Biology; **Dr. Yangseung Jeong** (faculty sponsor) Biology; "Identification of Skeletal Trauma Inflicted by Scavengers in Murfreesboro, TN"



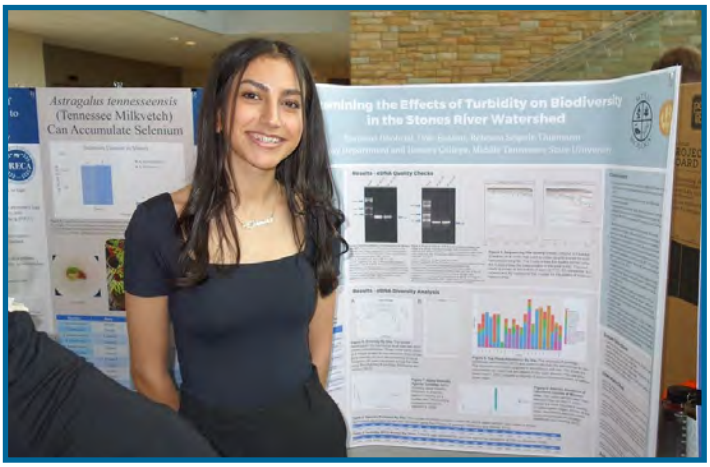
Sydney A. Ferguson, BS Biology; Daniel L. Bryant, MOBI, PhD; **Dr. Anthony Farone** (faculty sponsor) Biology; "Anti-inflammatory effects of Aurone-derived Triazoles on a Mouse Macrophage Cell Line"

SCHOLARS WEEK 2023

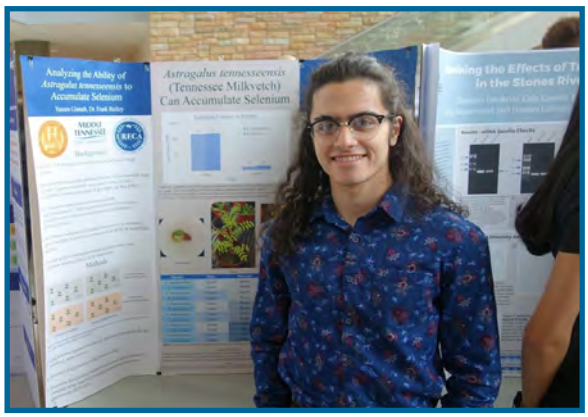
Scholars Week March 21—24, 2023



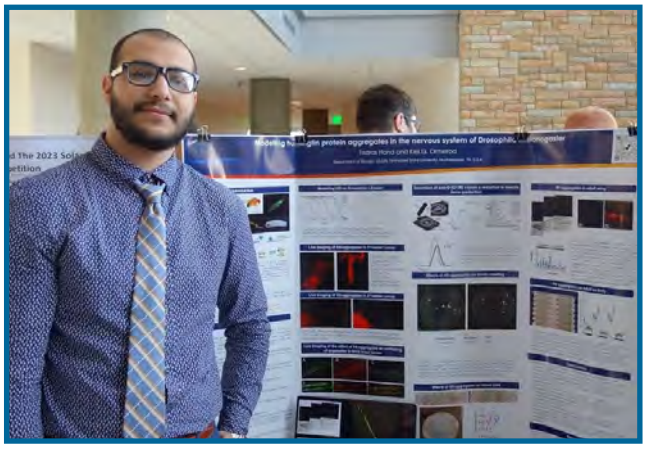
Alyssa S. Freeman, MSE, PhD; **Dr. Grant Gardner** (faculty sponsor) Biology; "Defining a Research Agenda Related to STEM Graduate Student Teaching Professional Development"



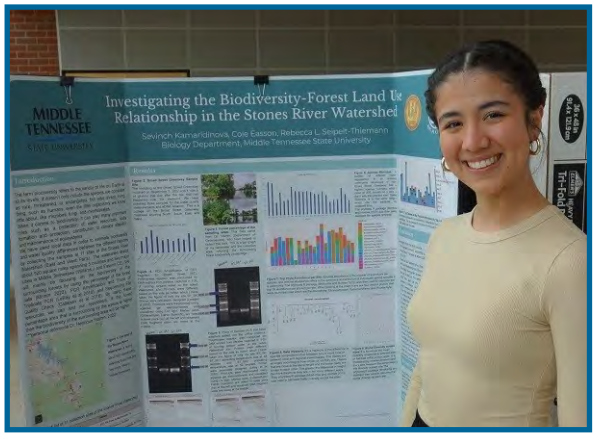
Karmina A. Ghobrial, BS Biology; **Dr. Rebecca Seipelt-Thiemann** (faculty sponsor) Biology; "Examining the Effects of Turbidity on Biodiversity in the Stones River Watershed"



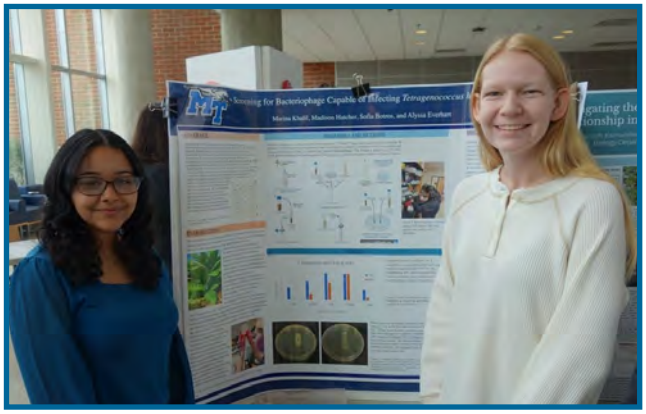
Yaseen M. Ginnab, BS Biology; **Dr. Frank Bailey** (faculty sponsor) Biology; "Analyzing the Ability of Astragalus Tennesseensis to Accumulate Selenium"



Tadros A. Hana, BS Biology; **Dr. Kiel G. Ormerod** (faculty sponsor) Biology; "Modeling Huntingtin Protein Aggregates in the Nervous System"

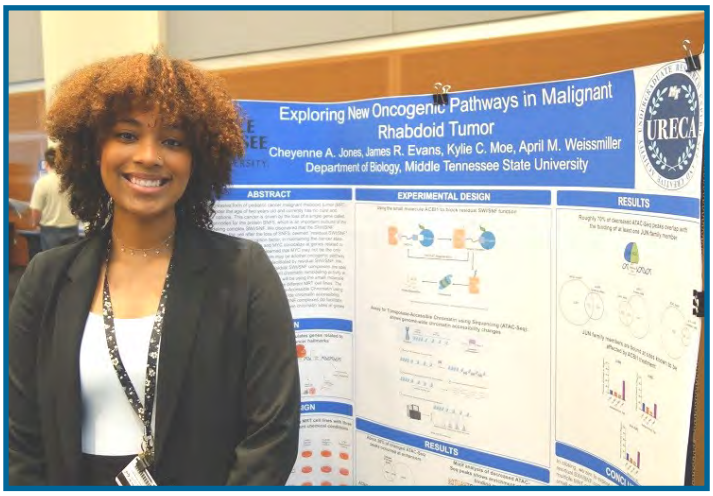


Sevinch Kamaridinova, BS Biology; **Dr. Rebecca Seipelt-Thiemann** (faculty sponsor) Biology; "Investigating the Biodiversity - Forest Land Use Relationship in the Stones River Watershed"

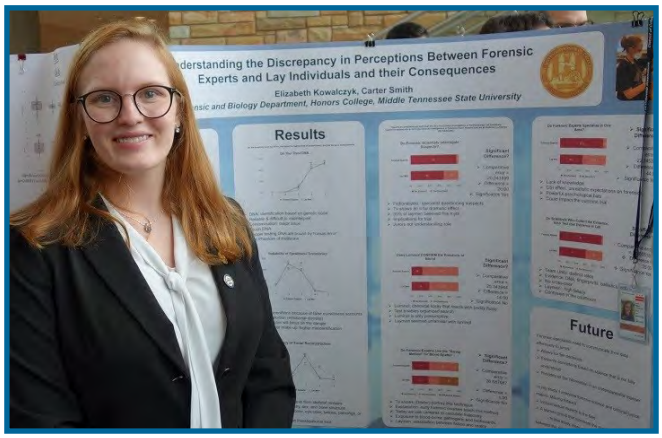


Marina S. Khalil, BS Biology; **Madison Hatcher**, BS Biology, Sofia Botros, BS Biology; **Dr. Stephen Wright** (faculty sponsor) Biology; "Screening for Bacteriophage Capable of Infecting Tetragenococcus halophilus"

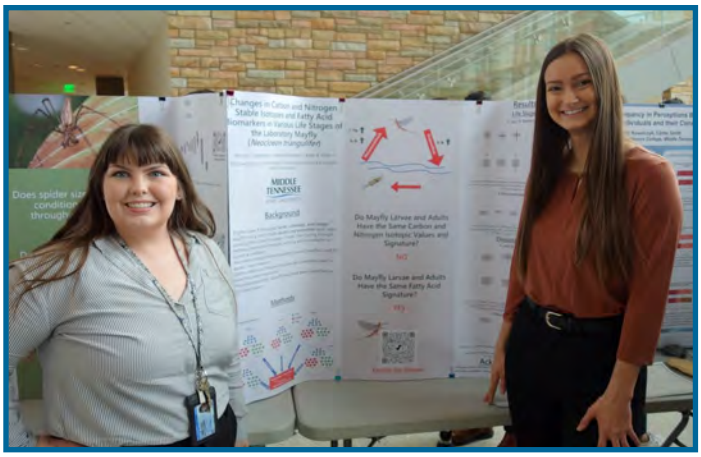
Scholars Week March 21—24, 2023



Cheyenne Jones, BS Biology, James Evans, BS Biology; Faculty Mentor: **Dr. April Weissmiller**, Biology; "Exploring New Oncogenic Pathways in Malignant Rhabdoid Tumor"

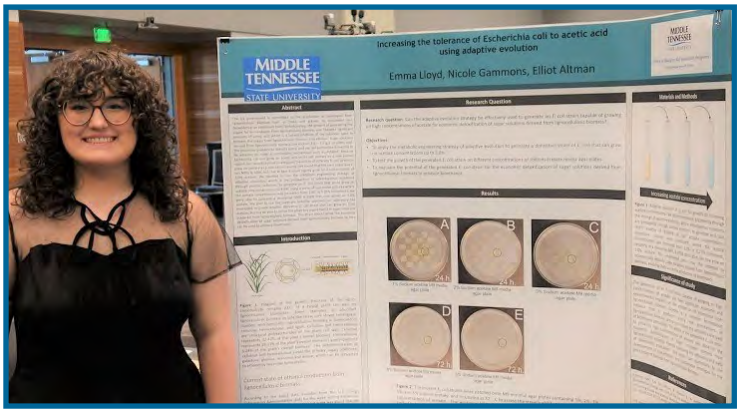


Elizabeth Kowalczyk, BS Forensic Science; **Dr. Carter F. Smith**, Criminal Justice Administration; "Understanding the Discrepancy in Perceptions Between Forensic Experts and Lay Individuals and their Consequences"



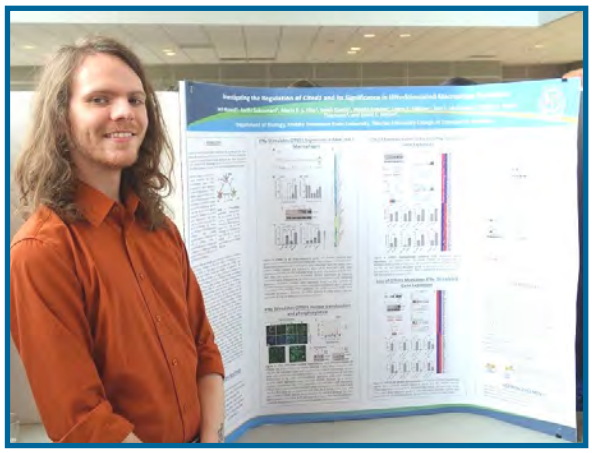
Jessica L. Landaverde, MOBI, PhD ; **Addison Plummer**, BS, Biology; **Dr. Ryan Otter**, (faculty sponsor), Biology; **"**Seasonal Variation in Size, Carbon and Nitrogen Stable Isotopes, and Fatty Acid Biomarkers in Tetragnathid Spiders"

Jessica L. Landaverde, MOBI, PhD ; **Dr. Ryan Otter**, (faculty sponsor), Biology; "Changes in Carbon and Nitrogen Stable Isotopes and Fatty Acid Biomarkers in Various Life Stages of the Laboratory Mayfly (Neocloeon triangulifer)"

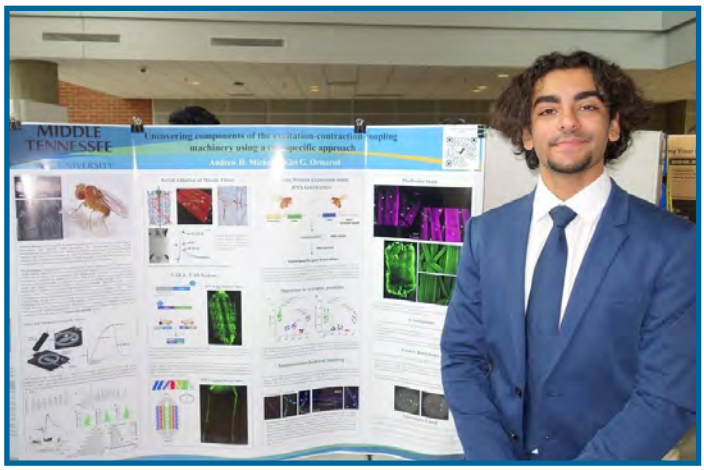


Emma Lloyd, BS Forensic Science, **Nicole Gammon,** PhD MOBI; **Dr. Elliot Altman** (faculty sponsor) Biology; **"**Using adaptive evolution to generate Escherichia coli strains that are superior at utilizing acetic acid as a sole carbon source"

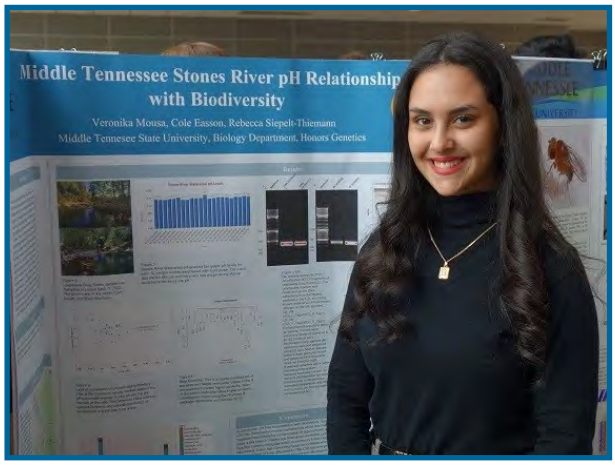
Scholars Week March 21—24, 2023



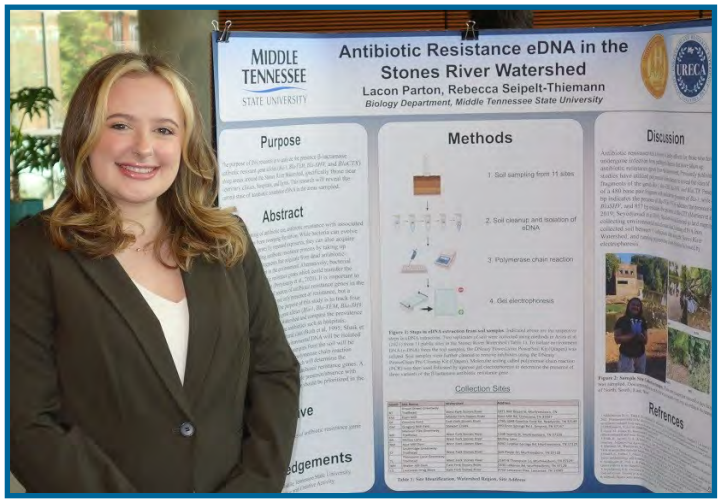
Jack N. Maxwell, MS Biology; **Dr. David Nelson** (faculty sponsor) Biology; "Investigating the Regulation of Cited1 and its Significance in IFNγ-Stimulated Macrophage Polarization"



Andrew H. Michael, BS Biology; **Dr. Kiel G. Ormerod** (faculty sponsor) Biology; "Uncovering Components of the Excitation-Contraction Coupling Machinery Using a Cell-Specific Approach"



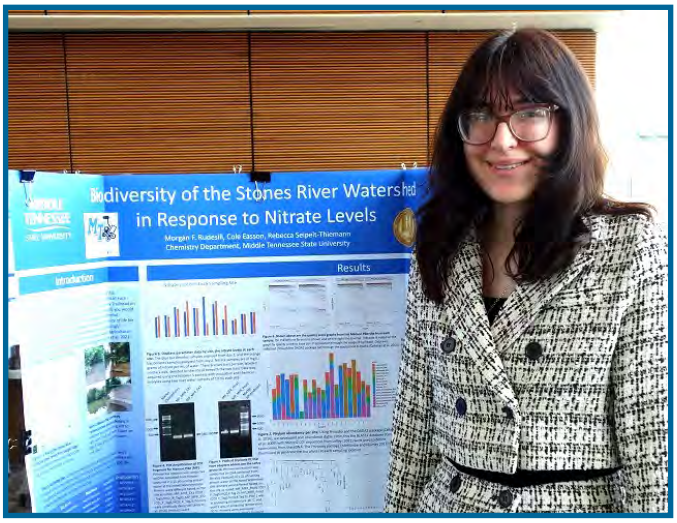
Veronika G. Mousa, BS Biology; **Dr. Rebecca Seipelt-Thiemann** (faculty sponsor) Biology; "Investigating the Stones River Watershed Biodiversity-pH Relationship"



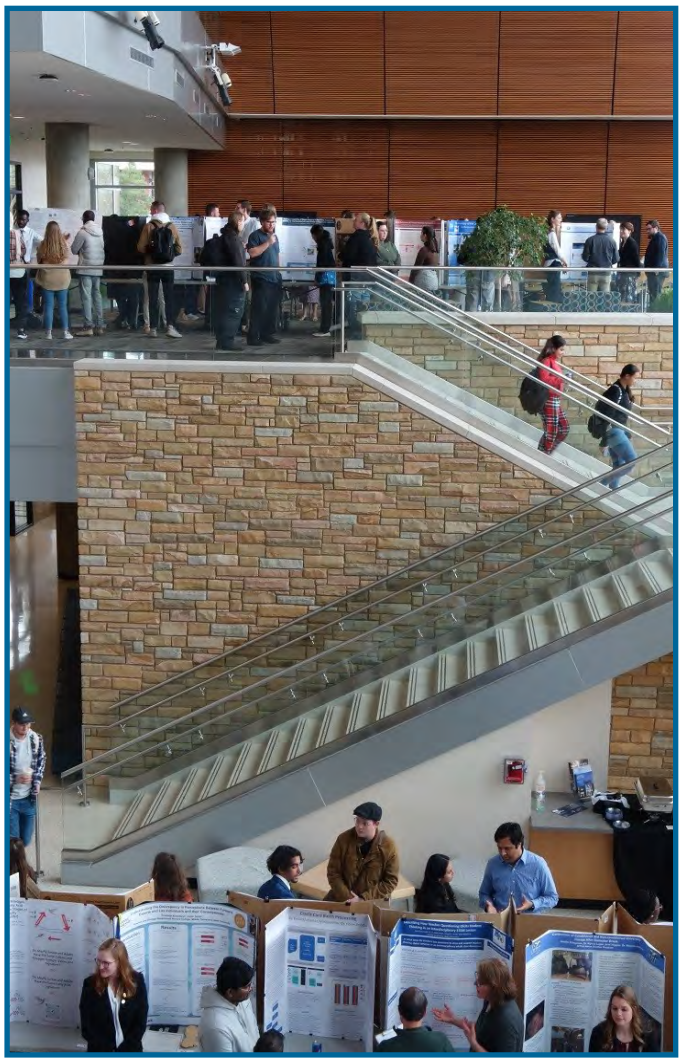
Lacon A. Parton, BS Biology; **Dr. Rebecca Seipelt-Thiemann** (faculty sponsor) Biology; "Antibiotic Resistance eDNA in the Stones River Watershed"

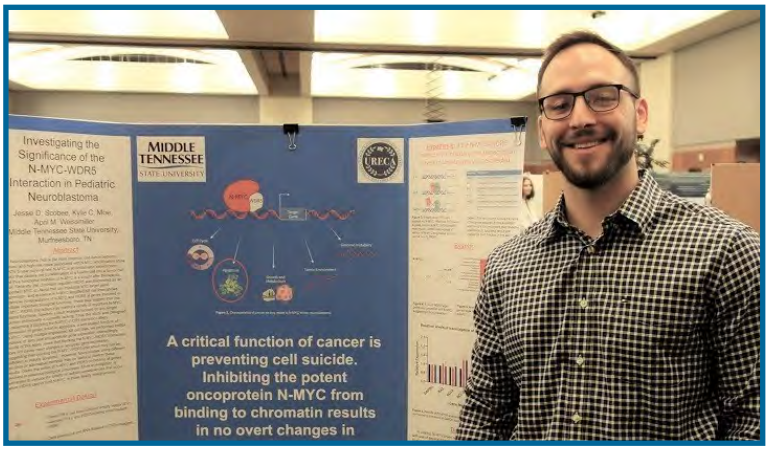
Kadence Riggs, BS Psychology; **Chelsea Rolle**, BS Biology; Faculty Mentor: **Dr. Grant Gardner,** Biology; "Exploring the Relationship between STEM Graduate Teaching Assistants' Perceived Teaching Autonomy and Pedagogical Discontentment: An Explanatory Mixed"

Scholars Week March 21—24, 2023

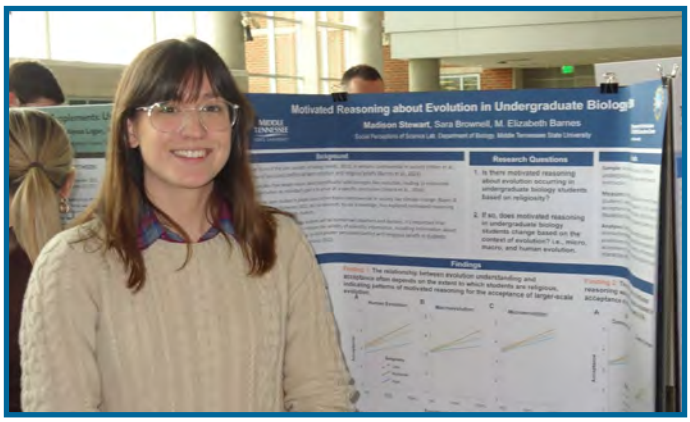


Morgan F. Rudesill, BS Biology; **Dr. Rebecca Seipelt-Thiemann** (faculty sponsor) Biology; "Biodiversity of the Stones River Watershed in Response to Nitrate Levels"

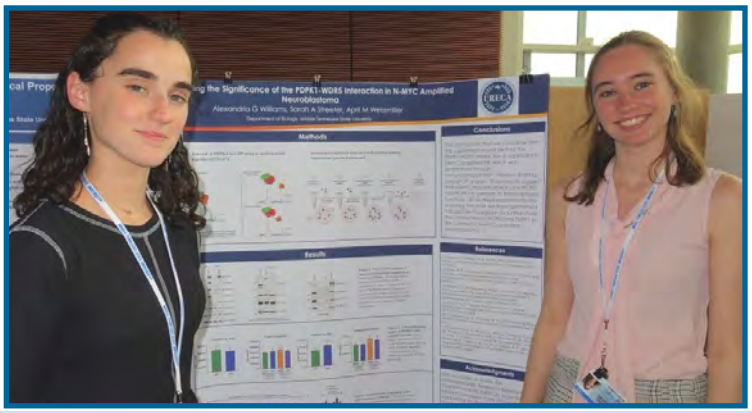




Jesse Scobee, BS Biology; Kylie Moe; Faculty Mentor: **Dr. April Weissmiller**, Biology; "Investigating the Significance of the NMYC-WDR5 Interaction in Pediatric Neuroblastoma"

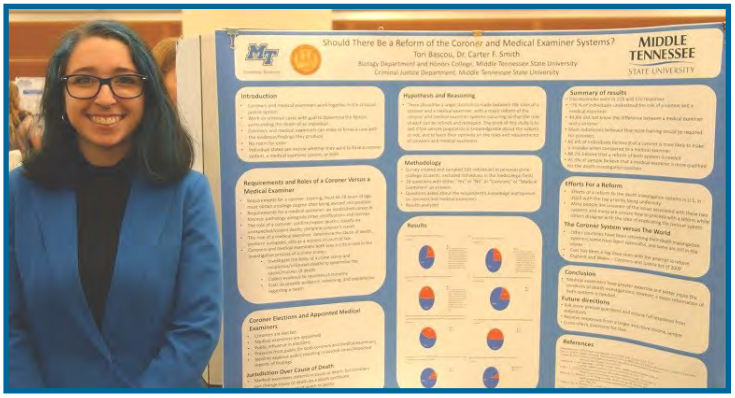


Madison E. Stewart, MS Biology; **Dr. Elizabeth Barnes** (faculty sponsor) Biology; "Exploring Patterns of Identity Protective Cognition about Evolution among Undergraduate Biology Students"



Alexandria G. Williams, BS Biology **(right), Sarah A. Streeter,** BS Biology; **Dr. April Weissmiller** (faculty sponsor) Biology; "Investigating the Significance of the PDPK1 and WDR5 Interaction in N-MYC Amplified Neuroblastoma"

University-Wide Poster Exposition—March 24, 2023



Victoria Bascou, BS Forensic Science; Faculty Mentor: **Dr. Carter F. Smith**; "Should There Be a Reform of the Coroner and Medical Examiner Systems?"

Rand Hasan, BS Biochem; **Cole Easson,** Faculty Mentor: **Dr. Rebecca Seipelt-Thiemann**; "The Stones River Watershed has Little Chlorine Pollution and Moderate Biodiversity"

Hampton Copeland, BS Chemistry, Amy Brown, BS Biochemistry, **Curtis Dearing (above)**, BS Biochemistry, Joshua Thammathong, BS Chemistry, **Garrett Tessmer, BS Biology**; Dr. Souvik Banerjee, Chemistry, **Dr. April Weissmiller**, Biology (faculty sponsors); "Molecular Modeling Guided Design and Synthesis of Unique Small Molecule Autotaxin Inhibitors for Application in Post-Stroke Rescue"

Doctoral Student Recognition

The **Distinguished Doctoral Research Award** was awarded by the College of Basic and Applied Sciences to Molecular Biosciences Ph.D. candidate,

Daniel Laird Bryant

Congratulations, Dan!!!

Undergraduate Student Recognition

Barry Goldwater Scholarship awarded to Forensic Science major

Elizabeth Kowalczyk

The Scholarship Program honoring Senator Barry Goldwater was designed to foster and encourage outstanding students to pursue research careers in the fields of the natural sciences, engineering, and mathematics. The Goldwater Scholarship is the preeminent undergraduate award of its type in these fields.

A special thank you to Dr. Stephen Wright and Dr. Thomas Holland for their mentorship.

Read More

Congratulations, Elizabeth!!!

2023 Biology 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. The Biology faculty congratulates every student recipient.

Sarah Barlow Scholarship: Awarded to a Graduate Teaching Assistant who is planning a teaching career at the secondary or college level.
Alyssa Freeman

Kurt Blum Scholarship: Awarded to support research efforts.
Ashley Gereben

William H. Butler, Jr. Graduate Research Scholarship: Awarded to graduate students to provide support for expenses associated with thesis research.
Alyssa Everhart ***Ashley Gereben***

Cynthia Chappell Summer Stipend: Awarded to support research efforts.
Jack Maxwell

Elliott Dawson/BioVentures Biotechnology Scholarship: Awarded to a Biology major who has taken or is currently enrolled in Biotechnology.
Mathew Thomas

Kevin Driver Memorial Biology Scholarship: Awarded to support research efforts.
Bailey Davenport

John D. DuBois Scholarship: Awarded to support research efforts.
Elizabeth Kowalczyk ***Gracie Johnson***

J.L. Fletcher Graduate Scholarship: Awarded to a beginning biology graduate student.
Cassandra Perrone

Thomas Hemmerly Graduate Research Scholarship: Awarded to provide support of expenses associated with thesis research.
Tawakalit Busari ***Jack Maxwell***

Freeman P. Jordan, Jr. Scholarship: Awarded to a Biology major in support of research.
Sierra Cruz ***Marina Khalil***
Bavly Labib ***Elizabeth McQueen***

Mitchell Magid Memorial Work Scholarship: Awarded to support research efforts.
Sofia Botros

Dennis Mullen Scholarship: Awarded to graduate students engaged in research in Vertebrate Biology or Aquatic Ecology.
Shelby McLoda

George G. Murphy Scholarship: Awarded to support research efforts.
Shivam Patel ***Clay Stalzer***

J. Gerald Parchment Scholarship: Awarded to support research efforts.
Abigael Smith

John A. Patten Scholarship: Awarded to support research efforts.
Tawakalit Busari ***Razyar Hawrami***
Cheyenne Jones ***Patrick McAtee***
Cassandra Perrone ***Camyla Rocha***

2023 Biology Scholarship Recipients

Horace B. and Helen Weaks Reed Endowed Scholarship: Awarded to a biology major. Preference given to a Tennessee resident with a minimum 3.0 GPA.

James Evans ***Ann Petty***
Mario Sidrak ***Sarah Streeter***
Alexandria Williams

Maria de los Reyes Biology Scholarship: Awarded to support research efforts.

Justin Washer

Wayne Rosing Biology Scholarship: Awarded to a Biology major of junior standing with a botany emphasis or a minor in Secondary Education.

Zaynab Akeel Alnassari

Eugene F. Strobel Scholarship: Awarded to a Biology major of junior standing who plans a teaching career at the secondary or college level.

Sydney Robbins

Sarah H. Swain Undergraduate Research Scholarship: Awarded to purchase supplies or support travel associated with research projects.

James Evans ***Ann Petty***
Mario Sidrak ***Alexandria Williams***

Marion R. Wells Graduate Research Scholarship:
Awarded to provide support for thesis research conducted during summer months.

Alyssa Freeman

C.W. Wiser Medical/Allied Health Award and Scholarship: Awarded to a graduating student who will continue studies in the medical sciences at a school of medical technology or other allied health field.

Carley Wardlow ***Sydney Ferguson***

Stephen M. Wright Research Scholarship: Awarded to support research efforts.

Stephen Borders ***Alyssa Everhart***
Sarah Streeter

John M. Zamora Graduate Research Scholarship: Awarded to purchase supplies or support travel associated with research projects.

Camyla Rocha

<u>Incoming Freshman Scholarships 2022-2023</u>

Patrick J. Doyle Freshman Scholarship: Awarded annually to an incoming freshman Biology major.

Ahmed A. Alnassari ***Delaney N. Thomas***

<u>Outstanding Students</u>

Clay M. Chandler Outstanding Freshman Biology Award and Scholarship: Awarded to an outstanding freshman Biology major.

Elle Lam ***Lydia Samuel***

Ralph E. Sharp Outstanding Sophomore Award and Scholarship: Awarded to a Biology major of sophomore standing based on academic performance.

Isaac Rippy

Philip M. Mathis Outstanding Junior Award and Scholarship: Awarded to a Biology major of junior standing.

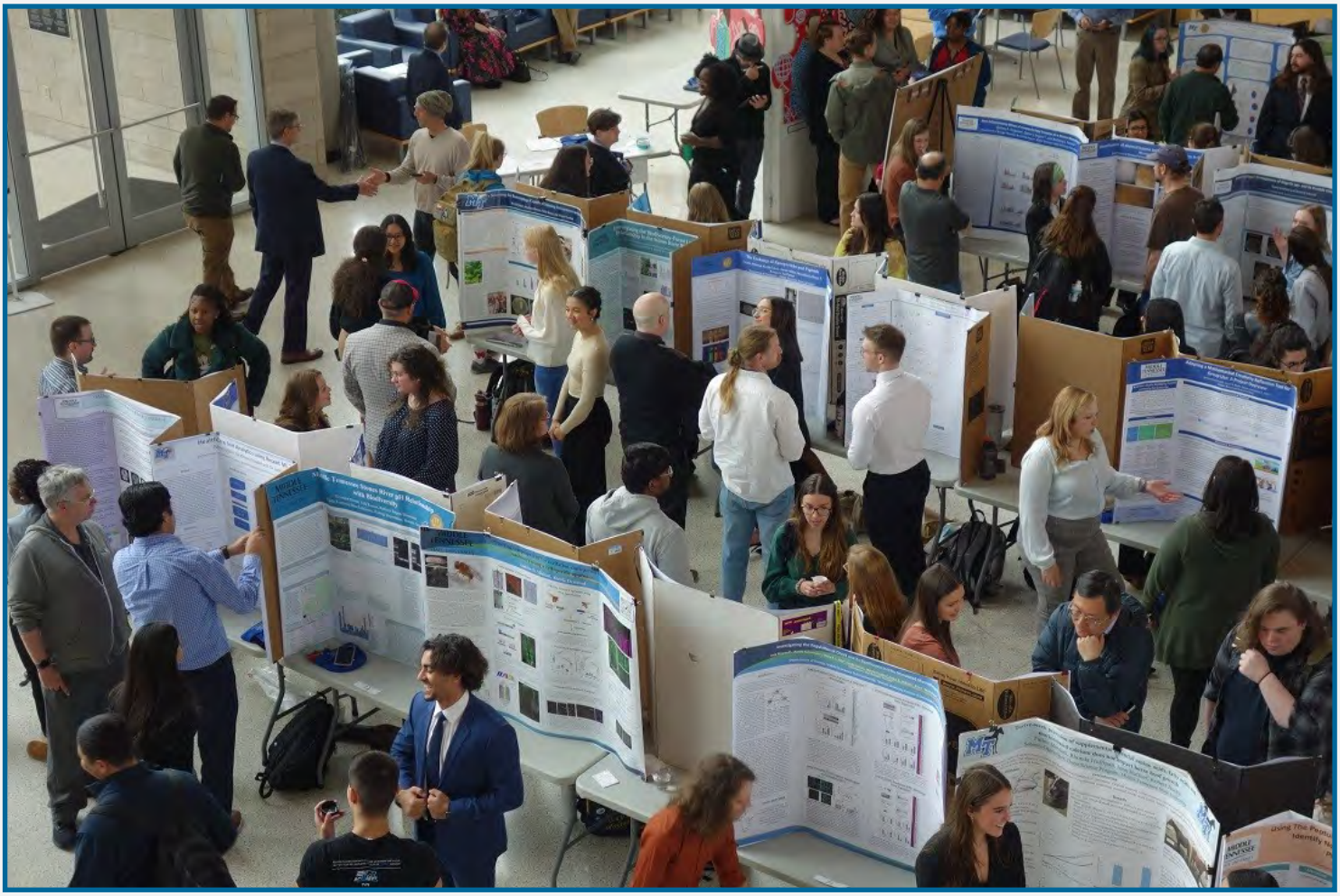
Lillian Bergman

Peter I. Karl Outstanding Senior Award: Awarded to the outstanding senior(s).

James Evans

David Sanborn Ecology Scholarship: Awarded to an outstanding junior that has shown an interest in the area of field biology.

Savannah Buist ***Alayna Root***



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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