



Dennis Mullen

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BioUpdate

Department of Biology, Middle Tennessee State University

Spring 2025

Message from the chair

This past year has been busy for the faculty and students in the Department of Biology. They published 19 peer-reviewed manuscripts (with 18 student coauthorships) and gave 42 presentations at regional/national conferences. Eightytwo undergraduate students were engaged in research this last year (a record) and 28 students (graduate and undergraduate) presented their research at this year's Scholars Week celebration. You can see a list of presenters and winners later in this edition. I am extremely proud of the accomplishments of our faculty and students. There are several changes to the faculty and staff to announce. This year we say goodbye to Amy Jetton, Kim Sadler and me. We are all retiring this summer. We welcome Megan Moore, Manuel Giannoni Guzman and Angela Google to the tenure track faculty. Megan is a Biological Anthropologist and joins the Forensic Science program. Manuel is a physiologist who studies bees, and Angela is a Science Educator. In the office we will say goodbye to Lyn Powers this summer, we are currently searching for her replacement. Melinda Beel moved to a different program and we hired Jaimie Raymond and Sarah Clark. Sadly, retired faculty members Padget Kelly and Kurt Blum passed away this last year. Please see the tributes to retiring and lost faculty and staff later in this edition. Be sure to check the Biology webpage (<u>https://biology.mtsu.edu</u>) for up to-date news and follow us on social media (Facebook, Instagram, and Twitter)



Dr. Jessica Arbour:

Like many other universities and museums around the country, behind the scenes in the Science Building at MTSU you will find several biological libraries (aka "collections") housing specimens of plants, fungi, birds, mammals, reptiles, fish, insects and invertebrates. Specimens may come as cleaned skeletons, pelts, "wet" specimens in alcohol, or even structures like nests and eggs. These valuable research and teaching repositories allow us to ask questions about changing ecosystems and species through time, as well as serve as essential teaching tools in our natural history and biodiversity classes. Most of the public will never see the majority of our research collections, which were often obtained during research trips and sometimes contain vulnerable or fragile materials. However, special taxidermy mounts have been donated from various individuals and local natural history institutions through the years, allowing the department to make some of these special collections viewable to students and the public.



Taxidermy display cabinets in the Science Building near the Friendship Street entrance. Left: First floor canid display, Right: Fish, reptiles, birds and mammals on the second floor

Dating as far back as the late 19th century, some of our most impressive pieces include an African Lion, Chimpanzee, Albatross and a large display of canids (wolves, coyotes and foxes). These and others can be found on public display around the first and second floors of the Science Building on campus. Our larger mounted items came primarily from the closure of the Nashville Cumberland Museum in the early 2000s as it converted into the Adventure Science Center. MTSU was prioritized for these donations thanks to our strong record in vertebrate zoology research by Biology Department Faculty like Dr. Brian Miller. While the old Science Building at one point featured a small one-room museum, the new science building did not initially include specimen exhibit spaces and most of these unique specimens went into collections storage when it opened. However, through the hard work of Biology faculty and staff, including Dr. Dennis Mullen, Dr. Kim Sadler, Tammy Jessen and Lyn Powers, to source funding and resources for display cabinets and add signage, the halls of the new Science Building have started to form a mini museum, bringing these important assets back into publicly accessible spaces.



Wandering Albatross near SCI1190

Wildlife Displays in the Science Building

Recently, Discovery Center staff reached out to me to ask if the Biology department was interested in taking on some of taxidermy collection they no longer feature on display. They inherited some of these pieces from the Cumberland Museum and the Scarritt Bennett Museum from prior closures. Stunningly, included in the list of potential donations was a pair of passenger pigeons, which used to number in the billions in North America and became extinct in only 1909. There are an estimated 1,500 preserved birds of this species left on earth, and such remains may be key to future attempts to decode their genome and restore this species. MTSU is incredibly lucky to be able to showcase this sad but important conservation story, and these two individual birds can be viewed in the Biology office on the second floor.



African Lion mount and skulls on the second



The Department of Biology's new rare passenger pigeon specimens. Photo credit to Dr. Brian Miller

In addition to this rare find, the donation from the Discovery Center included an undated but likely Victorian-era "curiosity cabinet" packed to the brim with small birds, featuring "wavy glass" (pre-industrial) and a hand painted backgrounds; it can be viewed in the window of SCI 1068. A Nile Crocodile skull collected in the 1920s, a rhino horn, elephant foot, many absolutely beautiful bird specimens (ferruginous hawks, golden eagles and a loon, among others), a variety of marine shells, and some small fossils also made their way into the displays and collections around the building. I hope, if you get a chance, you will spend some time wandering the halls of the first and second floor of the Science Building, especially around the Friendship Street entrance, and take in our lovely natural history displays. These small snapshots of the remarkable diversity of life on earth are a treasured resource that the Biology Department will continue to steward for years to come.

From the lab of Donald Walker

Lab Description

Members of the Microbiome Ecology Lab study the impact of emerging fungal pathogens on native wildlife. Specifically, they study interactions between the host skin and gut microbiomes and emerging fungal pathogens. Their research is critical to our understanding of the factors that determine the pathogenicity of those fungal organisms and helps to inform biodiversity conservation efforts. Fungal pathogens have been identified as major contributors to large-scale declines in amphibian and reptile populations around the world and are responsible for the extinction of many bat colonies in the eastern United States. Dr. Walker has published close to 50 peer-reviewed manuscripts. Most of those papers include student co-authors. Since his arrival at MTSU he has been awarded six external grants from state and federal agencies for a total of about \$2,300,000. Most notably he is a recent recipient of an NSF CAREER award (\$1,000,000). The CAREER award is NSF's most prestigious award for early career scientists and it serves as national recognition of the quality and impact of Dr. Walker's research up to this point and his potential to serve as an academic role model in both research and education.

Dr. Walker's research program has a strong outreach component. Over the past few years, he and his team have presented educational workshops for Motlow State Community College, Zoo Knoxville, The Nashville Zoo and Great Smoky Mountains National Park (GSMNP). Through these activities, they have had direct contact with over 300 students and have indirectly affected countless others through their efforts in training the education staff at GSMNP.

Recent Publications in 2024:

(Romer, A.S., Grisnik, M., Dallas, J.W., Sutton, W., Murray, C.M., Hardman, R.H., Blanchard, T., Hanscom, R.J., Clark, R.W., Godwin, C., Alexander, N.R., Moe, K.C., Cobb, V.A., Eaker, J., Colvin, R., Thames, D., Ogle, C., Campbell, J., Frost, C., Brubaker, R.L., Snyder, S.D., Rurik, A.J., Cummins, C.E., Ludwig, D.W., Phillips, J.L., Walker, D.M. 2024. Effects of snake fungal disease (ophidiomycosis) on the skin microbiome across two major experimental scales. Conservation Biology. https://doi.org/10.1111/cobi.14411

Vargas-Gastélum, L., Romer, A.S., Ghotbi, M., Dallas, J.W., Alexander, N.R., Moe, K.C., McPhail, K.L., Neuhaus, G.F., Shadmani, L., Spatafora, J.W., Stajich, J.E., Tabima, J.F., Walker, D.M. Herptile gut microbiomes: a natural system to study multi-kingdom interactions between filamentous fungi and bacteria. Msphere. 2024 Mar 26;9(3):e00475-23. https://doi.org/10.1128/msphere.00475-23

From the lab of Donald Walker

Funded URECA Projects:

2019 Summer	Kylie Bowe	The Endosymbiotic Community of the Causative Agent of White Nose Syndrome (Pseudogymnoascus destructans) of Bats	Biology	Donald Walker	Platinum
2019 Summer	Ashton Reece	Endosymbiotic Bacteria Impact the Function of an Important Wildlife Pathogen of Bats	Biology	Donald Walker	Platinum
2020 Summer	Kylie Bowe	The endosymbiotic bacterial community of the causative agent of White Nose Syndrome, (Pseudogymnoascus destructans) of bats	Biology	Donald Walker	Platinum
2022 Spring	Lillian Bergma n	Mechanistic interactions between a host, microbiome, and fungal pathogen	Biology	Donald Walker	Gold
2022 Summer	Claire Matzek	Host skin chemistry drives fungal-fungal interactions in a host-mycobiome-pathogen system	Biology	Donald Walker	Platinum
2022 Summer	Clay Stalzer	Host skin chemistry drives fungal-fungal interactions in a host-mycobiome-pathogen system	Biology	Donald Walker	Platinum
2023 Summer	Clay Stalzer	Fungal-fungal interactions on the skin of reptiles	Biology	Donald Walker	Platinum



Miami field trip - Chloe

Participating in fieldwork is such a unique opportunity that I will always be grateful for. During this past summer, I traveled with my lab group to Miami, Florida, to sample the gut microbiome of invasive amphibians and reptiles. This field trip was undergone in an effort to contribute to a larger collaborative project aimed at characterizing the gut communities of a wide diversity of herpetofauna. The days may have been long and the schedule hectic, but it was amazing to visit so many different sites in Miami and see such a diverse array of wildlife during this trip. Through this experience, I can now safely affirm that green iguanas and cane toads have the worst poop that I have ever smelled in my life.

From the lab of Donald Walker



This past summer, I attended my first Mycological Society of America (MSA) meeting in Ontario, Canada. I had never traveled outside of the United States before, and this was the first mycological conference that I had ever attended. As someone who does not have a strong mycology background, I really enjoyed networking with and learning from individuals with different knowledge and expertise than me, and hearing about their research as well as sharing my own research was remarkable. I also felt very honored to receive a Graduate Student Research Award for my poster presentation. In addition to attending MSA, I also had the opportunity to share my research at the 2024 Hellbender Symposium conference this past summer. It was awesome being able to meet other researchers who are also passionate about hellbenders!

From the lab of Donald Walker

Hellbender Work - Chloe



The biggest highlight during my time as a master's student here at MTSU is being able to work with the study species of my thesis project, the eastern hellbender. Eastern hellbenders are fully aquatic and are the largest North American salamander. Due to widespread population declines, they were recently proposed to be listed as federally endangered. By characterizing the gut microbiome of hellbenders for my thesis, I have been able to build connections with so many people, including other universities (Tennessee State University and Lee University) and zoos (Chattanooga Zoo and Nashville Zoo). These collaborations have allowed me to have memorable field experiences throughout Tennessee and develop a project that will help inform hellbender conservation. Since most of the hellbenders for my thesis project are involved in Nashville Zoo's headstart program, I was able to participate in the release of these zoo-reared hellbenders in May 2024. Seeing the hellbenders that I had been working with over the past year be released into native habitat was awe-inspiring, and being able to share how cool hellbenders are with the private landowners that were allowing us to release the animals on their land was amazing.



MSCC Outreach

Tennessee Promise Scholarship recipients from Motlow State Community College visited the MTSU campus to get an introduction to common techniques utilized by the Walker Lab to study Snake Fungal Disease. This included an introduction to skin microbiome sampling methods as well as a chance to visualize the assortment of bacteria and fungi that can be cultured using these methods. As an early career educator, this was a great opportunity to recontextualize my thesis research at scales that may be more applicable to students with less of a biology background.

From the lab of Donald Walker

Zoo Knoxville Outreach

Students from Pre-K to 8th grade were introduced to the significance of the microbiome to animal health as well as common methods for isolating components of the gut microbiome. This was a great opportunity to think through the research the Walker Lab does and how we can stress the importance of the microbiome to audiences with a wide range of back-ground information on the subject.



From the lab of Donald Walker

Louisiana Field Trip

This past July the Walker Lab met with members of the Spatafora Lab from Oregon State University and Stajich Lab from UC Riverside in Ponchatoula, Louisiana for field sampling related to a collaborative NSF funded project focused on bacterial-fungal interactions in the herptile gut microbiome. As a new member of the lab, this was a great opportunity to familiarize myself with some of the work associated with studying animal microbiomes as well as interacting with other collaborators who have similar research interests. Running around the swamps of Louisiana looking for amphibians and reptiles is a great way to get to know people.





From the lab of Donald Walker

Memphis Zoo

On November 25, 2024, members of the Walker Lab and the Undergraduate Microbiome Scientist Program (UMSP) had the opportunity to travel to the Memphis Zoo and collect skin swab samples from a group of federally threatened snakes commonly known as Louisiana pinesnakes (*Pituophis ruthveni*). These snakes are a part of one of the Memphis Zoo's conservation programs where they breed and release Louisiana pinesnakes onto protected habitat to restore Louisiana pinesnake populations in the wild. During our visit, we collected skin microbiome samples from both hatchlings and adult snakes. Members of the snake skin microbiome include various species of bacteria and fungi that can interact and support the snake host's immune system. By learning about these snakes' microbiomes, we can better understand the health of these snakes in captivity and how to improve their chances of survival once they are released. Future collaborations with the Memphis Zoo may allow us to collect samples from the released snakes and compare the microbiomes of captive snakes and released snakes.

-Tia King



From the lab of Donald Walker



Knoxville Zoo Outreach-Chloe

During the spring of 2024, I assisted with an Introduction to Veterinary Science camp at Zoo Knoxville. During this camp, high school students interested in veterinary medicine learn about the veterinary care requirements for maintaining wildlife in a zoo setting. My lab at MTSU contributes to this camp by emphasizing the importance of microbiology in understanding health and disease. Therefore, I was able to help teach students about basic microbiological techniques, such as plate pouring, micropipetting, and setting up Kirby-Bauer assays. Seeing students get excited about microbiology was truly incredible, and after the camp was finished for that day, our zoo collaborators allowed us to directly interact with the zoo's Aldabra tortoises, which was an unforgettable experience. Who knew that giant tortoises loved neck scratches!

Biology Lab Updates



This is a picture of Dr. Howard's Honors Ecology class (BIOL 3400) working on their experiment this semester. The experiment is designed to test for competition between two species of plants.

Kim Sadler's News

Center for Cedar Glade Studies



Kim Cleary Sadler, Co-director

It's hard to believe another year has passed in a blink, let alone that the Center for Cedar Glade Studies, established in 2005, has turned the corner to celebrate 20 years. Dr. Jeff Walck and I have been an effective team through shared and divided responsibilities ranging from the center's annual Research Roundtable, associated cedar glade species research projects, committee work with agencies associated with conservation, communication with the public, educational outreach, and many more activities. I am retiring this coming July but will continue to stay involved with the CCGS, focusing on public education about this unique ecological system. This region's staggering growth and development motivates me tremendously; limestone glades can't be put back once they are gone.

The printing date for BioUpdate overlaps with the Elsie Quarterman Cedar Glade Wildflower Festival dates. Please mark your calendar for future dates: May 2-4, 2025, and May 1-3, 2026! The 2024 Festival included three days with Cedars of Lebanon and Long Hunter State Parks. The Friday, May 3rd, event started with a seed-collecting workshop with Cooper Breeden from the Tennessee Plant Conservation Alliance. The evening program was spectacular, with three of our MTSU graduates presenting about cedar glade fauna: Dr. Matt Niemiller, cave biologist at the University of Alabama, Huntsville, and Sara and Steve Samoray, environmental consultants, spoke as representatives for the Tennessee Bat Working Group. The May 4, Saturday events began with a bird hike, led by Dr. Jeff Walck, and activities continued throughout the day with something for everyone! Gardening with native plants with Linda Robertson was so informative (Dr. Brian's Aunt); extended morning and afternoon hikes with Tennessee Associate Naturalist, Holly Taylor and Milo Pyne, retired from NatureServe and discoverer of Pyne's Ground Plum; Skipper the Owl and Ranger Shauna; Native Foods with Sharen Bracy, first female Tennessee ranger and biology graduate; botany by bicycle with Tennessee state botanist and biology graduate, Todd Crabtree; and many others. Long Hunter State Park hosted two hikes/wildflower talks with LA and Jason Allen on Sunday. The 2025 events will be detailed in BioUpdate next year, but if this edition posts before May 2 - 4, check out the events at www.mtsu.edu/glade-center. Copies of the joint CCGS and TNPS publication, Limestone Cedar Glades: An Introduction to Some Common and Rare Species, will be available for a \$15 donation to the Tennessee Native Plant Society. A special note for 2025 is the 9 a.m. morning hike, which is dedicated to one of the department's favorite botanists and conversationalists, Dr. Kurt Blum, who passed away this past fall. Kurt was a hike leader for the cedar glade wildflower hikes since the 1980s. Gardening with Native Plants,

Native Seed Collecting



Early Bird Hike with Dr. Walck, center



Linda Robertson wearing visor

Holly Taylor, Kim Sadler, Milo Pyne

Kim Sadler's News

Center for Cedar Glade Studies



Ranger Shauna and Skipper the Owl

Matt Niemiller and Cave Tour





Kurt Blum and graduate student Eli Fitch

Students in my Fall 2024 Honors BIOL 1030/31 courses spent time in the Cedar Glades to learn more about this unique ecosystem at Flat Rock Cedar Glades and Barrens, five miles from campus. With a permit from the Department of Environment and Conservation, students collected soil samples from different sites identified as "zones" by Dr. Elsie Quarterman. The soil samples were then rudimentarily analyzed for antibiotic-producing bacteria; results were presented to their peers in a poster session. This project is part of the Tiny Earth crowd-sourcing "Search for Antibiotic-producing Bacteria" curriculum. Thank you to Tammy Jessen and Dr. Mary Farone for their assistance with this project. They always come through for me!





Center for Environmental Education Kim Cleary Sadler, Director

Another year has gone by quickly as the CEE continues to offer outreach and programs to the public for more than 40 years. Since I am preparing to retire at the end of July, Dr. Matt Klukowski has graciously agreed to serve as faculty interim director. Like Cindi Smith-Walters, after retirement I will continue to work on several projects that mean a great deal to me.

Microscope Loan Program: One of those projects is the donation of microscopes to area schools, along with workshops on how to use the microscope. In spring 2024, classroom sets of microscopes were donated to multiple school systems, including Metro Nashville, Murfreesboro City, and Smithville schools. Additional microscopes were provided to other educational groups, such as homeschooling and nature centers. The CEE space was temporarily consolidated with MTeach for two years while space in DSB is being renovated. Other materials are available, too numerous to mention here, that have been placed in storage. If you or someone you know has a need for something related to biology, please don't hesitate to reach out.

MTSU Arboretum: Another project I will continue to be involved with is the MTSU Arboretum. I have maintained the signage for the trees, but aging, storms, and campus expansion have made it necessary to upgrade. Kristin England from Campus Planning has done a wonderful job mobilizing funding to add more trees and upgrade the status of the arboretum.

Monarch Way Station: A third project, the Monarch Waystation in the Science Building Courtyard, even though "wild," needs periodic attention as it moves into the sixth year. I'm hopeful newfound retired friends will join me in maintaining the native plantings.

Mack Prichard Library: The CEE connected the Mack Prichard Foundation to the MTSU Special Collections. Susan Martin, Special Collections Librarian, and Susan Hanson, Collections Curator, accepted more than 350 books, papers, and other memorabilia. A prolific writer, public speaker, and conservationist, Mack Prichard was Tennessee's first archeologist and naturalist.

News from Cindi Smith-Walters: Although Cindi retired in 2020, she continues to provide many outreach hours to the CEE. She has facilitated several Project WILD, Project Learning Tree, and Tennessee Forestry workshops, taught two Tennessee Forestry classes for the Tennessee Naturalist Program, worked with the Rutherford County Master Gardner program, and distributed trees for Tree Day. These are just a few of her contributions. Thank you, Cindi!

Center for Environmental Education from Kim Cleary Sadler, Director

Tennessee Amphibian Monitoring Program with Bob English

The Center for EE is more than grateful to Bob English for the work that he continues to do, for little compensation, but it has a huge impact on what we know about amphibian populations in Tennessee. The Tennessee Amphibian Monitoring Program (TAMP) celebrated its 21st year of gathering data on the frogs and toads of Tennessee. Our relationship with the UT's School of Natural Resources continues to provide much data from East Tennessee. The university has contributed data since Bob became TAMP state coordinator in 2004, led by Dr. Matt Gray of the School of Natural Resources. Bob provides the following updates on the TAMP program this past year.

We have a new TAMP volunteer running the West Tennessee route of La Grange for the first time in many years. On Run 2 she heard (and recorded) a chorus of Eastern Spadefoots! This is not a rare frog, but our TAMP volunteers do not often encounter it because it requires a tremendous amount of rain to fall and the breeding period is short. We also have a new volunteer on one of our routes on the Mississippi Alluvial Plain in extreme West Tennessee this year. This is an interesting area, and we look forward to getting data. We are gradually increasing the number of routes conducted in West Tennessee.

As in previous years, all TAMP data for the 2025 season will be entered into the GIS-based TAMP database. The integrated database containing all TAMP data from 2004 to 2025 will be updated at the end of this sampling season. This database is designed to be used with GIS and will be incorporated into the Tennessee Wildlife Resources Agency's State Wildlife Action Plan (SWAP) for 2025. The TAMP website continues to be a valuable tool for recruiting and training new volunteers and contains everything a new volunteer needs to begin collecting data. It even includes an online TAMP workshop. The University of Tennessee in Knoxville is using this resource as a teaching tool. The TAMP website is at <u>https://leaps.ms/TAMP.htm</u>.

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



Eastern Spadefoot

J. Hayes

BS Biology Student

National Association of Biology Teachers (NABT) 2024 Professional Development Conference

Anaheim, CA

November 14th-16th, 2024

My name is J. Hayes, and I'm an undergraduate research assistant in Dr. Liz Barnes's Social Perceptions of Science Lab and a learning assistant in Dr. Erin Rowland-Schaefer's General Biology 1 who recently travelled to present a study at the National Association of Biology Teachers (NABT) 2024 Professional Development Conference in Anaheim, California. In our lab, we study science communication within biology education, and for my project, we're focusing specifically on Christian undergraduate biology students' beliefs and communication about climate change. This group of students interests us because we know that in the United States more broadly, Christians – especially evangelical Christians – tend to have lower acceptance of climate change than other Americans, so this group could have the potential to be boundary spanners between their religious and scientific communities based on their shared beliefs and identities both as Christians and as biology students. They could only be effective boundary spanners, though, if they first accept climate change themselves. So, to guide this research, we asked questions like, "How do Christian students' acceptance and risk perception of (or how worried they are about) climate change compare to non-Christian religious students and non-religious students?" "What about evangelical and non-evangelical Christian students?" and "How do science communication value and selfefficacy compare among these different groups? (In this context, "self-efficacy" refers to students' confidence in themselves to communicate about culturally controversial science topics like climate change.)"

Via Likert-scale items on a survey, we found that Christian students had a statistically significantly lower acceptance and risk perception of climate change than non-Christian religious students and nonreligious students, but the mean scores for acceptance for each group were above 3, the midpoint in our scale from 1 (lowest acceptance) to 5 (highest acceptance). When we broke the Christian data down into evangelical and non-evangelical Christian students, their acceptance scores were still above 3 on average but were not statistically significantly different from each other; however, evangelical students' risk perception was much lower than non-evangelical students'. Finally, when we analyzed our value and selfefficacy constructs for science communication, we found no statistically significant differences between Christian, non-Christian religious, or non-religious students. For reference, these results came from 740 participants, 425 of which self-identified as Christians, and 64 of those Christians self-identified as evangelicals. These results matter because they show that Christian students tend to accept climate change and could be potential boundary spanners, but there is still room for progress. Thus, instructors could use conflict-reducing practices in their climate change content to improve students' acceptance and incorporate science communication instruction, particularly highlighting students' capacities for boundary spanning, to improve students' value and self-efficacy for climate change communication. We plan to expand upon these findings with an interview study in the spring of 2025.

The survey's design was led by Dr. Erin Rowland-Schaefer and Dr. Liz Barnes, who also both helped mentor this project. Analysis of the quantitative results could not have been done without Rahmi Aini, a student here at the MTSU Mathematics and Science Education (MSE) Ph.D. Program. The work and my travel were funded by NSF CAREER grant #2238174, NSF IPRF grant #2411565, the MTSU MSE Ph.D. Program, the MTSU Biology Department, and the Patrick Doyle Student Research Fund.

The NABT conference hosted more speakers and workshops than was possible to attend, but I am so grateful for being able to participate in the ones that I could. I learned so much about effective biology education, especially from workshops and talks presented by the National Center for Science Education, Dr. Katie Hinde, Brenda Royal, Dr. Janet Carlson, Alex Troutman, and all the wonderful researchers at the Biology Education Research Symposium. Specifically, I heard about engaging ways to teach scientific literacy, how to entertain students with games like March Mammal Madness, how to incorporate research and the outdoors into instructional content, and why active learning is so important for student learning outcomes. I also gained invaluable feedback from other educators and researchers on my project by presenting it at the conference's poster session, which has led to awesome new connections and inspiring conversations.



Andrew Hetrick

BS Biology Student Society of Environmental Toxicology and Chemistry (SETAC) 2024 Conference Fort Worth, TX October 20th-24th, 2024



I've been working under Dr. Frank Bailey's environmental toxicology research. My work with Dr. Bailey involves monitoring the concentrations of microcystin, an algal toxin that attacks liver tissue, in water, sediment, and arthropods in the Stones River. This toxin is becoming more important to study as the abundance of microcystin producing blooms. My research recently has focused on the use of environmental DNA to detect the genes that code for microcystin itself. The Society for Environmental Toxicology and Chemistry's annual meeting involves talks and poster sessions to share current research going on in the field that year. Through funding by MTSU I was able to attend and present a poster for the research I had been working on. Attending SETAC in October of 2024 allowed me to meet and share my research with toxicologists from around the world. I got the opportunity to meet researchers from around the world conducting similar research and form connections that would not have been possible otherwise.

Matthew Stout MS Biology Program Association of Southeastern Biologists Myrtle Beach, SC March 12-15, 2025

I recently attended the 86th meeting of the Association of Southeastern Biologists in Myrtle Beach, SC. With topics ranging from plant and aquatic ecology to microbiology and cell biology, this conference was thoroughly engaging and particularly helpful in connecting with other scientists. Several opportunities were presented to expand upon my research and connect with several organizations and fellow researchers. Overall, this conference provided me with an outlet to share my research in various scientific communities and direct me toward future career goals. I had the opportunity to present my master's thesis research examining the flowering phenology, pollination, and reproductive success of Pyne's Ground Plum (Astragalus bibul*latus*) – a federally endangered perennial legume endemic to the limestone cedar glades of Rutherford County, TN – and Tennessee Milkvetch (Astragalus tennesseensis) which is more widespread and abundant throughout its range in Tennessee. While morphologically similar, differences in pollination ecology between these two species may contribute to differences in their reproductive output, survival, and population persistence. Understanding differences in pollination ecology and reproductive biology may help explain the differences in population abundance, density, and geographic range of these two congeners and inform conservationists on designing practical and successful recovery plans for both species. I would like to give special thanks to Dr. Herlihy, Dr. Walck, and Dr. Arbour for guiding and encouraging me during my time working on this project.



Hannah Sisk BS Biology Benthic Ecology Meeting Mobile, AL April 1st-4th

I had the opportunity to attend and present at a national conference for the first time at the 52nd Annual Benthic Ecology Meeting in Mobile, Alabama, alongside Zuhayra Mohamed, a fellow Biology undergraduate student here at MTSU, and Dr. Cole Easson. From April 1st through the 4th, I was fully immersed in research presentations on marine topics ranging from coral reef diseases to the economic impact of climate change.

At this conference, I presented research that I completed under the guidance of Dr. Easson on biogeographic variation in the microbial symbionts of two species of sponges across the West Atlantic Ocean. Sponges (Phylum *Porifera*) are vital in coral reef habitats, providing structure to the reef itself and playing an important role in nutrient cycling. The microbes that reside in the sponges are crucial to their health and metabolism as they are responsible for fixing nitrogen and carbon and other nutrient-cycling activities. Understanding how sponge microbiomes vary regionally grants a glimpse at the identities and roles of these symbionts and can help marine scientists better understand the dynamics of these communities.

Attending the Benthic Ecology Meeting was an incredibly valuable experience where I was able to explore the world of marine biology at every level through the many presentations that took place over the conference. It was interesting to see such a wide variety of experimental designs and techniques and get a wider view of what research topics are relevant.



Zuhayra Mohamed

BS Biology Benthic Ecology Meeting Mobile, AL April 1st-4th

I presented my research on the microbial community within *Aplysina cauliformis*, a common Caribbean sponge, as it is affected by both disease and climate change stressors of ocean acidification and ocean warming. I worked on the project with Dr. Cole Easson and his collaborator Dr. Deborah Gochfeld at the University of Mississippi. This project was significant because it shows that marine organisms can also be affected by climate change.

I presented at the Benthic Ecology Meeting Society in Mobile, AL, the week of March 30, 2025. It is a conference focused on marine ecosystems, promoting research for marine scientists to learn from various aspects. I benefitted from attending the conference by meeting with our collaborator, and also by interacting with other students and scientists at the conference regarding their work. Attending a range of session talks on various marine topics allowed me to learn new information that I had not previously researched. I'll be carrying the knowledge I gained from the conference with me as I continue to pursue my studies in science.



Department Graphic Shirts

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

Short-Sleeve:	\$15		
Insulated Lunch Bag:	\$8		
Coffee Mugs:	\$10		
All items can be purchased in the department office			

(SCI 2044)

or by email at

Biology@mtsu.edu.



Congratulations to **Dr. Dennis Mullen** on his retirement from MTSU in June 2025! Dennis began his career in the Biology Department at MTSU in 1991, when he was hired as an Ichthyologist/Ecologist replacing longtime faculty member Dr. Clay Chandler. Since then, he has dedicated his entire academic career to the department, students, and staff of MTSU. Throughout his career as a faculty member, Dennis has been an invaluable member of the Biology Department, highly regarded by faculty, students, and administrators for his quiet wisdom and thoughtfulness in matters related to the department. He has consistently demonstrated the highest standards of teaching and mentorship and has been a role model for his colleagues and students alike, positively impacting the lives of those around him. Beyond his classroom teaching, Dennis has mentored numerous graduate students in their Master of Science research in the fields of Ichthyology and Aquatic Ecology. As a nod to his excellent service and leadership qualities, Dennis was offered and subsequently accepted the Interim Chair position in the Biology Department in 2019. A year later, having led the department through the COVID pandemic, the Biology faculty and the Dean unanimously voted to appoint him the permanent Chair, where he will remain until his retirement. Outside of the Biology Department, Dennis and Susan have been wonderful friends and neighbors to MTSU staff, hosting and organizing numerous gatherings, baby showers and staff functions over the years.

Dennis has had an exceptional >30-year tenure as a faculty member and will be remembered by both faculty and students for his friendly and approachable demeanor as well as his uncompromising dedication to excellence in everything he did. His students love and respect him for his passion, and especially for commitment to helping each of them reach their full academic potential. Dennis' smile, sense of humor, institutional knowledge, and wisdom will be missed by his colleagues, staff and students alike. While we are sad to see him go, we wish Dennis a very happy and active future with time to travel with his wife Susan, enjoy great fishing trips, and visit with his children, Finn and Bronwyn.

- Frank Bailey





On May 31 of this year the Department of Biology will lose one of the most impactful members of our department. **Lyn Powers** is retiring. Lyn joined the department on June 1, 2008, as a Technical Clerk under then Chair George Murphey and moved into the Executive Aid role under Lynn Boyd on July 16, 2012. This position was upgraded to Coordinator on April 1, 2019, from which she will retire. Everybody that has walked through this office knows how valuable Lyn has been to our program. Through her leadership, Lyn has developed an office environment where everybody respects, trusts and supports each other. The staff have excellent working relationships with the faculty, the graduate students, and the staffs of other departments. This office is where problems come to die. Lyn has provided leadership to executive aids in other departments across the college, as well as the across the university. I am quite proud of the Biology office and staff and Lyn is the main driving force behind their excellence.

On a personal note, any successes that I had as Chair can be attributed in no small part to the fact that I had Lyn as an Executive Aid. Lyn's knowledge of the inner workings of the University, her creativity, her wisdom and, most importantly, her patience were invaluable resources for me as I learned my role as Chair and navigated the many issues that have faced this department over the last six years.

Please join me in congratulating Lyn and wishing her nothing but happiness as she spends more time with Nick, Tyler and Elizabeth, Spencer and Katie, her 3 grandchildren and her crafts.

- Dennis Mullen



Dr. Amy Jetton will be retiring this summer after 31 years of dedicated service to the MTSU Department of Biology. Amy's curiosity in animals was fostered in part by growing up on her family's farm in northwestern Tennessee. After pursuing interests in music and then computer science, she returned to zoology and earned her B.A. in the College Scholar's Program from the University of Tennessee Knoxville where she completed an undergraduate thesis on the hormonal regulation of uterine secretions. The summer after graduation Amy worked as a research assistant at Oak Ridge National Labs where she studied mutagenesis in rodents.

After a brief visit home, Amy flew over 9,000 miles to Melbourne, Australia where she completed a 15-month fellowship in Dr. Marilyn Renfree's lab at Monash University researching the reproductive physiology of Tammar wallabies. With her interest in seasonal reproduction solidified, Amy traded the mild climate of southern Australia for the bitterly cold winter winds of northern Illinois. She completed her Ph.D. in neurobiology and physiology from Northwestern University training in Dr. Fred Turek's circadian rhythm lab. Her dissertation focused on the regulation of the pituitary gland in seasonally reproducing hamsters. Her Ph.D. finished, Amy traveled east to continue her research in hamsters and completed a postdoctoral position at the University of Massachusetts Amherst in the circadian rhythm lab of Dr. Eric Bittman.

Having travelled extensively from her family's farm, Tennessee beckoned, and lucky for us, Amy joined the MTSU Department of Biology in the fall of 1994. Amy contributed immeasurably during her 31 years as a member of the Biology Department through her teaching, research, advising, and collegiality.

She taught many courses, with a focus in physiology, endocrinology, human anatomy and physiology, and ethology among others. Amy always had a great rapport with her students, aided by her sense of humor and down-to-earth common sense. She was well-loved by her students, despite the challenging nature of her physiology courses. Numerous students benefited from her expert advice given over three decades. Widely regarded as "the go-to pre-medical advisor," she served on the pre-medical interview committee continuously since being hired. She wrote approximately 1,000 letters of recommendation for students! Amy cared deeply about her students, believed in them, and counseled the ones that came to her with common sense advice. She was recognized by graduating students numerous times as a Faculty Member that Makes a Difference. Over the years Amy directed several M.S. theses and served on the committees of many additional graduate students. She authored several research papers on a wide range of topics from the effects of melatonin on pituitary gland secretions in golden hamsters to bone density in cyclists. In addition to helping students, Amy served as a mentor over the years to numerous newly hired faculty members who have benefited from her extensive knowledge about the inner details and workings of the university. Her voice in faculty meetings will be greatly missed as will her service on university, college, and departmental committees.

When you miss Dr. Jetton in the future, as we all will, just look up and you may see her flying overhead (she and her husband Spence are both licensed pilots after all).

- Matt Klukowski



Dr. Kim Cleary Sadler will retire from MTSU after a decades-long career as a Professor of Biology. Hers is a career marked by passion for, and commitment to, MTSU's students and environmental education. An alumna, Kim earned her B.S. and M.S. in Biology from MTSU; her M.S. focused on Botany. She earned her Ed.D. from Tennessee State University. Kim joined the Biology tenure-track faculty in 2002 after serving as temporary MTSU faculty since 1989; she also previously taught high school biology and acted as a water quality consultant. In her tenure at MTSU, she excelled in all three aspects of a university professor's responsibilities (teaching, research/scholarship and service).

Kim taught a variety of courses in the department including Biome Analysis, Topics in Environmental Education and Biological Literature. Much of her teaching has centered on the general education Biology course and Biology courses with an education focus. Her excellence in teaching at MTSU is evidenced by the many awards (General Education Teacher of the Year, Experiential Learning Outstanding Faculty Award, MTSU Older Wiser Learners Professor of the Year Award, Higher Education Science Teacher of the Year, Phi Kappa Phi Influential Faculty Award) she has received. Kim played an im-

portant role in the development of the Mathematics and Science Education Ph.D. program, and as a member of the doctoral faculty, she mentored several students through that program. Perhaps most significantly, her students have recognized her as a Faculty Member that Makes a Difference.

Kim's research and scholarship in the field of science/biological/environmental education are significant and include research papers in biological education published in national journals, book chapters on topics in science education, laboratory manuals for university biology courses, teacher resources/DVDs, cedar glade flower booklets, and technical reports on environmental issues. She has dozens of conference presentations—many of which include students as collaborators.

Perhaps Kim's most notable achievements are in the area of outreach and service to the MTSU community and beyond. Kim has served as the director of MTSU's Environmental Education Center; through the center, she has raised awareness about the importance of the environment and its inhabitants. She has been the Center for Cedar Glade Studies Co-director since 2005, fostering educational and research opportunities about this important ecosystem. As an investigator, Kim is responsible for bringing in millions of dollars in grant money, supporting MTSU student research, protecting the environment, and promoting environmental education. In recognition of her service, Kim has been awarded multiple awards including the MTSU Public Service Award, the Tennessee Compact Award for Community Service and the MTSU Foundation Public Service Award.

Through Kim's hard work, the MTSU campus has been recognized as a Level 1 Certified Arboretum by the Tennessee Urban Forestry Council; she has developed materials to support using the trees on campus as a learning experience for students and the general public. She has also developed a native wildflower space in the Science building courtyard, identified as a Monarch Way Station. Kim's service and outreach extend beyond MTSU. As the Director of Scopes for Schools, she provided K-12 teachers with professional development in microscope technique and loaner microscopes. She has served as President of both the Tennessee Academy of Science and the Tennessee Association of Biology Teachers as well as regional director for the National Association of Biology Teachers.

Retirement will allow Kim more time with family. Husband Jay, sons Luke and Caleb, and three grandsons will benefit from more time with her. But, knowing Kim, we anticipate that her activities and impact in environmental education and outreach will continue.

Well done, Kim; we will miss you!

- Michael Rutledge

Full-Time Temporary and Adjunct Faculty Play Major Roles

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

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

Full-Time Temporary Faculty

Dr. Logan Bowling, B.S. 2013, Middle Tennessee State University; Ph.D. 2020, Middle Tennessee State University.
Teaching: Genetics lecture and labs and Cell and Molecular Biology Labs
Dr. Danielle Brown, B.S. 2001, Cornell University; M.S. 2006 and Ph.D. 2011, University of California—Davis. Teaching: General Biology II lecture, Human Anatomy and Physiology I and II labs, and Ethology
Dr. Siti Hidayati, B.S. 1986, University of Gadjah Mada; M.S. 1993 and Ph.D. 2000, University of Kentucky. Teaching: Exploring Life lecture, Ecology labs, and Senior Seminar
Dr. Amy Massengill, B.S. 1993, Stetson University; D.V.M. 1997, University of Florida. Teaching: Human Anatomy and Physiology II labs and Comparative Anatomy of the Vertebrates labs
Dr. Angelique Troelstrup, B.S. 2000, M.S. 2003, Ph.D. 2016, Middle Tennessee State University. Teaching: Human Anatomy and Physiology I and Iab

Adjunct Faculty

Hannah Brown, Teaching: Principles of Radiation in Medicine Andrea Y. King, B.S. 2016, Middle Tennessee State University. Teaching: Introduction to the Forensic Science Major

BioUpdate

Dennis Mullen, department chair (Dennis.Mullen@mtsu.edu) Produced by MTSU Department of Biology

0425-1537 / MTSU prohibits discrimination based on sex, race, color, national origin, or other protected categories. Report concerns to the Title VI/IX Coordinator. See our full policy at mtsu.edu/iec.

2024-25 Graduate Teaching Assistants

For the 2024-2025 academic year, the department is providing support to 26 M.S.- level and 8 Ph.D.- level graduate students who serve as graduate teaching assistants (GTAs). Thirteen of these students have received undergraduate degrees from colleges and universities other than MTSU. Seven hold baccalaureate degrees in subjects other than biology (agriculture, biochemistry, exercise science, forensic science, and microbiology). All have the requisite training in biology to serve as departmental teaching assistants. Without these GTAs, the department would be unable to offer the many sections of the non-majors biology course (BIOL 1030) and the majors freshman courses (BIOL 1110/1120), along with some sophomore and junior laboratories. The department is very pleased to have them.

M.S. Biology Graduate Teaching Assistants

Irene Addo, B.S., Biochemistry, 2016, Bells University of Technology Carson Bailey, B.S., Biology, 2023, University of Tennessee Southern Hardik Bansal, B.S., Biology, 2023, Middle Tennessee State University Danial Clark, B.A., Geology, 2009, Western Washington University Chloe Cummins, B.S., Biology, 2022, University of Tennessee Southern Grace Curley, B.S., Biology, 2023, Middle Tennessee State University Alyssa Everhart, B.S., Biology, 2021, Middle Tennessee State University David Gregor, B.S., Biology, 1990, Middle Tennessee State University Charitha Guntupalli, B.T., Biotechnology, 2023, Vignan's University Tadros Hana, B.S., Biology, 2023, Middle Tennessee State University Tia King, B.S., Biology, 2022, Middle Tennessee State University Taylor Mayes, B.S., Biology, 2024, Middle Tennessee State University Parth Patel, B.S., Biology, 2023, Middle Tennessee State University Cartiae Pounds, B.S., Biology, 2023, Middle Tennessee State University Alyssa Quinn, B.S., Biology, 2021, San Francisco State University Nikki Reed, B.S., Biology, 2023, Middle Tennessee State University Lael Reel, B.S., Biology, 2023, Tennessee Technological University



2024-25 Graduate Teaching Assistants

Camyla Rocha, B.S., Biology, 2020, Middle Tennessee State University Nathan Rogers, B.S., Biochemistry, 2017, Middle Tennessee State University Ross Rubin, B.S., Biology, 2024, State University of New York Hayley Sandusky, B.S., 2021, Martin Methodist College Brisco Schaefer, B.A., Biology, 2019, Concordia University Nebraska Matthew Jacob Stout, B.A., Biology, 2023, Carson-Newman University Ian Tomazzolli, B.S., Biology, 2023, Middle Tennessee State University Deborah Webb, B.S., Biology, 2024, Middle Tennessee State University Joshua Whitlock, B.S., Biology, 2024, Middle Tennessee State University

Ph.D. Graduate Teaching Assistants

Molecular Biosciences Program

Joy Creighton, B.S., Biology, 2014, Georgia Southern University Nicole Gammons, B.S., Biology, 2018, Middle Tennessee State University Josh Griggs, B.S., Biochemistry, 2024, Middle Tennessee State University Amelia Mitchell, A.B., Environmental Biology, Washington University, St. Louis Alex Rurik, B.S., Biology, 2023, Westmont College Michael Swaenepoel, B.S., Biology, 2017, Western Carolina University Csilla K. Szepe, B.S., Biology, 2018, Middle Tennessee State University Maheswari Vaghela, B.S., Microbiology, 2018, M. G. Science College



Theses and Dissertations Completed 2024-2025

Master's Theses

<u>Fall 2024</u>

Robert Dixon, 2024, Assessing the Effects of the Pharmaceutical Environmental Contaminant Atorvastatin on the Molting Cycle of the Red Swamp Crayfish, *Procambarus clarkii*

(Drl Frank Bailey, Dr. April Weissmiller, Dr. Mengliang Zhang- thesis committee)

Carter Ayers, 2024, Deciphering the genetic and gene regulation adaptation strategies of *Cryptococcus neoformans* passaged in mice of different MHC haplotypes

(Dr. Rebecca Seipelt-Thiemann, Dr. Erin McClelland, Dr. Mary Farone - thesis committee)

Spring 2025

Hardik Bansal, 2025, The Neural Odyssey: Mapping neuropeptide synthesis and trafficking in motor neurons

(Dr. Kiel Ormerod, Dr. Dave Nelson, Dr. Prabhodh Abbineni - thesis committee)

Nikki Reed, 2025, Exploring the functional consequence of novel colchicine binding site tubulin inhibitors in neuroblastoma cell lines

(Dr. April Weissmiller, Dr. Jason Jessen, Dr. James Robertson - thesis committee)

Chloe Cummins, 2025, Gut microbiome dynamics of North America's largest salamander, Cryptobranchus alleganiensis alleganiensis

(Dr. Donald Walker, Dr. Jessica Arbour, Dr. William B. Sutton - thesis committee)

Tadros Hana, 2025, Exploring the development and physiological impacts of htt aggregates on nervous and peripheral tissue

(Dr. Kiel Ormerod, Dr. Rebecca Seipelt, Dr. Robin Cooper - thesis committee)

Theses and Dissertations Completed 2024-2025

Ph.D. Theses

Spring 2025

Jessica Landaverde, 2025, Rethinking Food Web Tracing: A Conceptual Framework Utilizing a Multi Biomarker Approach to Better Understand Trophic Relationships

(Dr. Frank Bailey, Dr. Ryan Otter, Dr. Jeff Leblond, Dr. Dan Hua, Dr. Marc Mills- thesis committee)

Reed Alexander, 2025, Molecular Investigation of Composition and Function of the Soil Microbiome in Restored Federal Wetlands from Landscape to Lab

(Dr. Frank Bailey, Dr. Ryan Otter, Dr. Allison Veach, Dr. Jeffrey Walck, Dr. Walker - thesis committee)

Alumni News



Gayle Dawson, teacher at Blackman High School and an MTSU Biology graduate, was nominated for Teacher of the Year in both 2004 and 2024. Last summer she was also chosen to participate in an intensive work-shop at CERN (the European Council for Nuclear Research) in Geneva, Switzerland. She spent 2 weeks learn-ing about current particle physics research. <u>Click here</u> to read the full article.

Alumni News

Brooks Leyhew is a recent graduate of MTSU with a BS in Biology concentrating in Biotechnology. He was awarded an internship in Panama working with a Smithsonian researcher studying tropical fungi. His Smithsonian internship finished earlier this month and was wonderful experience. He exponentially grew both professionally and personally during the 3 months and was able to see many things only a select few get to see, such as Barro Colorado Island. Fungi are incredible on an individual level and on an ecosystem level, just like sponges.











Alumni News

Daniel A. Roberts (who goes by Dan Roberts, nickname "JD" in Air Force) graduated with a BS in Biology (1997) and an MS in Biology (2007). He retired in September 2024 as a full colonel in the Air Force after more than 27 years of service. During most of his time with the Air Force, he was an aerospace physiologist helping to prepare pilots for the physiological demands of flight, particularly preparing fighter pilots for the tough physiological challenges of high altitude and high gravity (G) loads during high-performance flight maneuvers. He has recently moved back to the middle Tennessee area where he grew up. He is now the senior consultant/owner for Performance PHYS LLC based in Milton, TN. He is married to his wife, Christi, and has 2 sons. Read his biography below.



COLONEL DANIEL A. ROBERTS

Colonel Daniel A. "JD" Roberts is the Commander of the 97th Medical Group, Altus AFB, OK. In this role, he is responsible to provide healthcare to more than 7,600 Department of Defense beneficiaries. The Medical Group ensures wartime readiness by promoting the health, safety, and morale of base active duty personnel, and trains medical personnel in support of world-wide contingency operations.

Colonel Roberts entered the Air Force by ROTC in 1997 and his primary background is in operational aerospace physiology and safety. He has deployed in support of numerous operational exercises, as well as support of combat operations to include OPERATION(S) Northern Watch, Southern Watch, Enduring Freedom, and Iraqi Freedom. As a human factors consultant he has participated on multiple Safety, Accident, and Friendly Fire Investigation Boards.



Colonel Roberts served as Executive Secretary for a DoD Task Force, leading the first-ever Strategic Plan for accident reduction. He has led a Headquarters Air Force level re-engineering for an entire career field, co-championed by the Air Force Surgeon General and the Air Force Director of Operations, Plans, and Requirements. Colonel Roberts has conducted research into simulator based spatial disorientation/task management training, human factors in fighter aircraft, extensively worked with the use of Reduced Oxygen Breathing Devices (ROBD), and directed the sole Night Vision Goggle Advanced Instructor Course for the Air Force. He commanded the 325th Medical Support Squadron and served as the Chief, Aviation Management Branch at Headquarters Pacific Air Forces where he was responsible for the organization, training, and equipment of PACAF combat forces aviation support programs. Prior to his current duties, Colonel Roberts served as the Chief of the Aircrew Performance Division, Directorate of Training and Readiness, Headquarters United States Air Force In this role he also served as the Career Field Manager for Aerospace Physiology, and was responsible for the functional oversight of 400 aerospace physiology personnel, policy, and requirements. He is a Fellow in the Royal Aeronautical Society and an Associate Fellow of the Aerospace Medical Association.

EDUCATION:

1997 B.S. Human Physiology, Middle Tennessee State University, Murfreesboro, TN
1998 Systems Acquisition Management, Lackland AFB, TX
1999 Aerospace Physiology Officer Course, Honor Graduate, Brooks AFB, TX
2004 Squadron Officer School, In-Residence, Maxwell AFB, AL
2007 Air Force Institute of Technology, M.S. Human Physiology, Middle Tennessee State University
2008 Air Command and Staff College (Correspondence and In-Residence Equivalency)
2009 Intermediate Executive Skills Course
2013 Air War College, Excellent Graduate, Distance Learning
2015 Joint Senior Medical Leader Course
2017 Combined/Joint Air and Space Operations Senior Staff Course

Alumni News

ASSIGNMENTS:

- 1. 1997-1998, Lieutenant Utilization Program, Safety Office, 93rd Air Control Wing, Robins AFB, GA.
- 2. 1998-1998, 47th Flying Training Wing, Laughlin AFB, TX.
- 3. 1998-1999, Researcher and Commander's Action Officer, Human Systems Center, Brooks AFB, TX.
- 4. 1999-2001, Aerospace Physiologist, 20th Aeromedical Dental Squadron, Shaw AFB, SC.
- 5. 2001-2005, Chief, Human Performance Training Team, 35th Aerospace Medicine Squadron, Misawa AB, Japan.
- 2005-2007, Student, Air Force Institute of Technology, Civilian Institution, Middle Tennessee State University
- 7. 2007-2009, Chief, Air Force Human Factors and Operational Safety, Office of the Air Force Chief of Safety, Pentagon, Washington, DC
- 8. 2009-2010, Assistant Director of Operations, Aerospace and Operational Physiology Programs, Office of the Air Force Surgeon General, Pentagon, Washington, DC.
- 2010-2011, Flight Commander, 779th Aerospace and Operational Physiology Flight, Andrews AFB, MD
- 10. 2011-2015, Flight Commander, 359th Aerospace and Operational Physiology Flight and Director, USAF Night Vision Goggle Advanced Instructor Course, Randolph AFB, TX
- 11. 2015-2017, Commander, 325th Medical Support Squadron and Deputy Commander, 325th Medical Group, Tyndall AFB, FL
- 12. 2017-2019, Chief, Aviation Management Branch, Pacific Air Forces, Directorate of Air and Cyberspace Operations (PACAF/A3TC), Joint Base Pearl Harbor-Hickam, HI
- 13. 2019-2021, Military Consultant and Chief, Aerospace Physiology, Office of the Surgeon General, Air Force Medical Readiness Agency, Defense Health Headquarters, Falls Church VA
- 14. 2021-2022, Chief, Aircrew Performance Division, Directorate of Training and Readiness, Deputy Chief of Staff for Operations, Headquarters United States Air Force, the Pentagon, Washington, District of Columbia
- 15. 2022-Present, Commander, 97th Medical Group, Altus AFB, OK

MAJOR AWARDS AND DECORATIONS:

Legion of Merit Meritorious Service Medal, 6 Oak Leaf Clusters Aerial Achievement Medal USAF Commendation Medal, 2 Oak Leaf Cluster USAF Achievement Medal, 2 Oak Leaf Clusters

EFFECTIVE DATES OF PROMOTION:

Second Lieutenant	28 May 1997		
First Lieutenant	28 May 1999		
Captain	28 May 2001		
Major	01 July 2007		
Lieutenant Colonel	01 September 2013		
Colonel	01 May 2021		

(Current as of June 2022)

In Memoriam



Dr. Kurt Blum passed away on 10/25 2024 – Dr. Blum joined the department in August of 1969 and retired in 2013. He was a popular teacher who enjoyed teaching students the importance of keen observation and analytical thinking in scientific work. Dr. Blum taught courses in dendrology, flowering plants, nonflowering plants, and biology for non-majors. He was involved in local programs to popularize, he introduced new courses in taxonomic concepts and dendrology, he taught summer courses at the Tech Aqua Biological Station (Center Hill Reservoir) and conducted numerous environmental impact studies and collected plant materials in Central America for the USDA. In placing his work into context, Dr. Blum noted that every plant is a sophisticated molecule factory whose products are often discovered at some later point to have important applications. This fact, he said, can be used as a powerful argument for the need for conservation and species preservation.

Dr. Padget Kelly passed away on 8/29/2024 – Dr. Kelly joined the department in August of 1991 and retired in 2015. He taught the non-majors Biology course, the old Zoology course, and Biology for Elementary Teachers. He also taught Biome Analysis during summers in the Florida Keys and spring breaks in Maui. The most enjoyable part of his job was working with pre-service teachers in the Biology for Elementary Teachers course. His students credit him with turning them on to biology just like his mentors did for him. Global warming and other environmental pressures make it imperative that teachers be well-informed and excited to teach environmental biology, and Padgett devoted his career to that mission. Padgett was co-director of the MTSU Center for Environmental Education (CEE). In this capacity, he presented numerous workshops for both teachers and students, most notably with the assistance of a 68-foot-long, inflatable humpback whale. He estimates he has given over 250 whale presentations to more than 200,000 high school students. During his time at Project C.E.N.T.S. and the CEE, he presented workshops to more than 30,000 teachers. Dr. Kelly's work with environmental education garnered him several local and national awards.









The Fall Research Open House, held 11/7/2024, 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!



Andrew Hetrick, Biology; Dr. Frank Bailey (faculty sponsor) Biology; "Investigation into the use of Biotechnology for the detection of Microcystin producing cyanobacteria"



Emily Callison, Biology; Dr. David E. Nelson (faculty sponsor) Biology; "Monitoring macrophage anti -fungal activity using a live cell imaging approach"

The 2024 Fall Research Open House



Gracie Jacoway, Biology; **Dr. Elliot Altman** (faculty sponsor) Biology; "Development of a Consortium Approach for the Efficient Production of Bioethanol from Lignocellulosic Biomass"



Nichole Stude, Biology; Dr. Elliot Altman (faculty sponsor) Biology; "Saccharomyces cerevisiae, Scheffersomyces stipites, and Escherichia coli variant analysis for economical production of bioethanol"

The 2024 Fall Research Open House



Ashley Lira-Rivera, Biology; Dr. April Weissmiller (faculty sponsor) Biology; "Investigating the effect of SNF5 on cell lines derived from small cell carcinoma of the ovary, hypercalcemic type cancers"



Andrew England, Biology; Dr. David E. Nelson (faculty sponsor) Biology; "Assessment of Fetal Liver-Derived Alveolar-Like Macrophages (FLAMs) and Their Differentially Expressed Genes to Validate as a New Model for Studying C.neoformans Respiratory Infection"

The 2024 Fall Research Open House



Cedra Kamel, Biology; **Dr. David E. Nelson** (faculty sponsor) Biology; "Regulation of CITED1 Transcriptional Activity by Phosphorylation"

Additional poster presentations:

Clay Stalzer, Biology; **Dr. Donald Walker** (faculty sponsor) Biology; "Exploring the fungal diversity and bacterial-fungal interactions in herpetofauna microbiomes"



Scholars Week Highlights Faculty and Student Research

Scholars Week March 17-21, 2025

Middle Tennessee State University held the 19th Annual Scholars Week March 17-21, 2025.

Scholars Week is a weeklong tradition during which MTSU's academic colleges celebrate scholarship, research, and creative activity through a variety of events and activities. The department presented 26 posters at the CBAS poster day in the SCI atrium and 17 at the university-wide poster session. Authors of these posters included 15 faculty members, 6 graduate students, and 25 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 <u>https://www.mtsu.edu/scholarsweek/index.php</u>

The following are posters from the Department of Biology.

Congratulations to the CBAS 2025 Poster Day Competition authors and their faculty mentors!



CBAS 2024 Poster Day Competition Winners

Ian Wilson, BS Biology; Tatyana Martinez; Dr. Donald Walker (faculty mentor); "The Snake Fungal Disease Pathogen Influences the Evolution of the Skin Microbiome"



Derek Wiggins, PhD MOBI; **Dr. David Nelson** (faculty mentor); "Cryptococcus neoformans Increases Host Macrophage Glycolytic Flux in an in vitro Pulmonary Infection Model"



Rahmi Aini, PhD MSE-BioEd; **Dr. Elizabeth Barnes** (faculty mentor), Biology; "conVIZ: A New R Package for Analyzing and Visualizing Concept Networks in Biology Education"



Ahmed Alnassari, BS Biology; Dr. Elizabeth Barnes (faculty mentor); "Perceptions of Evolution and Evolution Education among Undergraduate Muslim Biology Students in the United States"



Julia Barnett, BS Forensic Science; Deborah Webb; Dr. Cole Easson (faculty mentor); "Environmental DNA Analysis for Detecting Endangered and Invasive Species: Monitoring Eastern Hellbender, Tennessee Cave Salamander, Zebra Mussels, and Asian Carp in River Ecosystems "



Jenna Brooks, BS Forensic Science; Daniel Clark, MS Biology; Dr. Rebecca Seipelt; "The Science of Death: Autopsy, Postmortem Changes, and Wound Analysis"



Collin Clark, BS Biology; **Dr. Kiel Ormerod** (faculty mentor) "The Role of Projectin in Neuromuscular Physiology "



Jenna Brooks, BS Forensic Science; Dr. Rebecca Seipelt (faculty mentor); "Effects of UV Exposure on Alternative Splicing of Daf-2 in C. elegans"



Devin Barnett, BS Biology; **Dr. Cole Easson**; "Unidentified Creatures Altering Our Water Supply? Genetic Identification of Tennessee Sponges."



Hamza Fareed, BS Biology; Dr. Kiel Ormerod (faculty mentor); "Role of Elastic Proteins in Cardiomyocytes "



Mary Foley, ; Dr. Elizabeth Barnes; "CURE Inception: Teaching Undergraduate Biology Students Science Communication About Culturally Controversial Topics by Having Them Research How Undergraduates Currently Communicate"



Kate Coscia, PhD MSE; **Dr. Elizabeth Barnes** (faculty mentor); "Exploring the Impacts of Science Communication Instruction on Introductory Undergraduate Biology Students' Ability to Communicate About Culturally Controversial Science Topics"



Ellaleigh Hall, BS Biochemistry; **Dr. Rebecca Seipelt** (faculty mentor); "Nitrogen and Biodiversity in the Stones River Watershed"



Lydia Folorunsho, BS Biology; **Dr. Jessica Arbour** (faculty mentor); "Exploring Neural Anatomy in Percid fishes"



Joy Creighton, PhD MOBI; Dr. Jason Jessen (faculty mentor); "Frizzled 7- Dependent Regulation of Planar Polarity and Cell Migration in Zebrafish Gastrulation"



Alyssa Freeman, PhD MSE; Dr. Grant Gardner and Dr. Sarah Bleiler-Baxter (faculty mentors); "Measuring STEM Department Teaching Culture: A Survey Developed using Self-Determination Theory"





J. Hayes, BS Biology; Dr. Elizabeth Barnes (faculty mentor); "Exploring Christian Undergraduate Biology Students as Potential Boundary Spanners about Climate Change"

Lidya Kumar, BS Biochemistry; Taylor Mayes, MS Biology; Rangeen Taher, BS Biology; Dr. Anthony Newsome (faculty mentor); "Culture of Amoebae from Faucet Heads in Middle Tennessee Residence"



Peter Malak, BS Biology; Dr. Rebecca Seipelt (faculty mentor); "The Effects of Total Dissolved Solids on Biodiversity Throughout the Stones River Watershed"



Zuhayra Mohamed, BS Biology; Dr. Cole Easson (faculty mentor); "Microbiome Shifts in Aplysina Cauliformis Due to Ocean Acidification and Ocean Warming"



Olivia Moreno, BS Biology; Saad Ali; Nuhan Jalal; Madison Yahn; **Dr. Vincent Cobb** (faculty mentor); "Temporal Pattern of Foraging Activity in Leafcutter Ants: A 24-Hour Analysis in Costa Rican Forest"



Claudia Roselio, BS Biochemistry; **Dr. John Zamora** (faculty mentor); "Affinity of Microorganisms to Dental Materials"



Alex Rurik, PhD MOBI; Dr. Donald Walker (faculty mentor); "Characterization of the Reptile and Amphibian Gut Micro- and Mycobiome; Discovery of Undescribed Basidiobolus Diversity"



Zaylan Spinner, BS Animal Science; Dr. Rebecca Seipelt and Dr. Cole Easson (faculty mentors); "Investigating the Impact of Total Alkalinity on Biodiversity in the Stones River Watershed"



Nikhil Shrestha, BS Biology; Dr. Matthew Klukowski (faculty mentor); "Efficacy of Topical Administration for Acutely Elevating Corticosterone and its Influence on Testosterone and Circulating Leukocytes in Male Eastern Fence Lizards (Sceloporus undulatus)"



Hannah Sisk, BS Biology; Dr. Cole Easson (faculty mentor); "Exploring Biogeographic Variation in Microbiome Communities of Sponges in the Western Atlantic"

Scholars Week University-Wide Winners



J. Hayes, BS Biology; Dr. Liz Barnes (faculty mentor); "Exploring Christian undergraduate biology students as potential boundary spanners about climate change"



Brittney Williams, BS Biology; **Dr. April Weissmiller** (faculty mentor); "Interrogating Novel Tubulin Inhibitors on the A375 Melanoma Cancer Cell Line"

University-Wide Poster Exposition—March 21, 2025



Aya Abdouni, BS Biology; **Dr. Cole Easson** (faculty mentor); "Genetic Barcoding of darter in Middle Tennessee"



Zaynab Alnassari, BS Biology; Dr. Cole Easson (faculty mentor); "Perceptions of Evolution and Evolution Education amoung Undergraduate Muslim Biology Students in the United States"

University-Wide Poster Exposition—March 21, 2025



Donye Asberry, BS Biology; **Dr. Liz Barnes** (faculty mentor); "Exploring the impact of a science communication lesson on undergraduate biology students' ability to communicate"



Alyssa Freeman, MSE-BioEd; Dr. Grant Gardner (faculty mentor); "Measuring STEM Department Teaching Culture: A Survey Developed using Self-Determination Theory"



Devin Barnett, BS Biology; **Dr. Cole Easson** (faculty mentor); "Unidentified Creatures Altering Our Water Supply? Genetic Identification of Tennessee Sponges"



Kate Coscia, PhD MSE; **Dr. Elizabeth Barnes** (faculty mentor); "Exploring the Impacts of Science Communication Instruction on Introductory Undergraduate Biology Students' Ability to Communicate About Culturally Controversial Science Topics"

University-Wide Poster Exposition—March 21, 2025



Beari Jangir, BS Biology; **Dr. Grant Gardner** (faculty mentor); "Unpacking the Interplay of Autonomy, Discontentment, and Self-Efficacy: Effects on Graduate Teaching Assistants' Engagement in Professional Development"



Rahmi Aini, PhD MSE-BioEd; **Dr. Elizabeth Barnes** (faculty mentor), Biology; "conVIZ: A New R Package for Analyzing and Visualizing Concept Networks in Biology Education"



Collin Clark, BS Biology; **Dr. Kiel Ormerod** (faculty mentor); "The Role of Projectin in Neuromuscular Physiology "



Ian Wilson, BS Biology; Tatyana Martinez; **Dr. Donald Walker** (faculty mentor); "The Snake Fungal Disease Pathogen Influences the Evolution of the Skin Microbiome"

University-Wide Poster Exposition—March 21, 2025



Hamza Fareed, BS Biology; Dr. Kiel Ormerod (faculty mentor); "Role of Elastic Proteins in Cardiomyocytes "



Ellaleigh Hall, BS Biochemistry; **Dr. Rebecca Seipelt** (faculty mentor); "Nitrogen and Biodiversity in the Stones River Watershed"



Andrew Hetrick, Biology; Dr. Frank Bailey (faculty sponsor) Biology; "Investigation into the use of Biotechnology for the detection of Microcystin producing cyanobacteria"

University-Wide Poster Exposition—March 21, 2025



Zuhayra Mohamed, BS Biology; **Dr. Cole Easson** (faculty mentor); "Microbiome Shifts in Aplysina Cauliformis Due to Ocean Acidification and Ocean Warming"



Claudia Roselio, BS Biochemistry; **Dr. John Zamora** (faculty mentor); "Affinity of Microorganisms to Dental Materials"

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



Elliott P. Dawson BioVentures, Inc. Scholarship

Zaynab Akeel Alnassari Bailey A. Davenport Larissa Davis Andrew James Hetrick Laurel Grace Thompson John Reasonover Lacie Behary

> C.W. Wiser Medical/Allied Health Scholarship Lacie Behary Mackenzie Sneed

Undergraduate Scholarships

Mary C. Dunn Quasi-Endowment

Gracie Kathryn Choate Alyssa Hildebrandt Alexis Ann Katz Christian Lee Taylor Madison Leslie Yahn

Freeman P. Jordan, Jr. Memorial Scholarship

Alyssa Hildebrandt Alexis Ann Katz

Horace B. and Helen Weaks Reed Endowed Scholarship

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Padgett Kelly Research Scholarship Gracie Kathryn Choate Madison Leslie Yahn John Patton Scholarship Gracie Kathryn Choate Madison Leslie Yahn Stephen M. Wright Research Scholarship

Gracie Kathryn Choate Laurel Grace Thompson

Graduate Scholarships

Sarah F. Barlow Biology Scholarship

Alyssa Quinn

Mary C. Dunn Graduate Scholarship

Taylor Mayes

Dennis Mullen Vertebrate Biology/Aquatic Ecology Research Scholarship

Alyssa Quinn

Stephen M. Wright Research Scholarship

Taylor Mayes



Summer Stipends

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

Horace B. and Helen Weaks Reed Endowed Scholarship

Ian Tomazzolli

Alyssa Quinn

Mary C. Dunn Quasi-Endowment

Daniel Clark Tia King

Ross Rubin



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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.

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