

# BioUpdate

Department of Biology, Middle Tennessee State University

Spring 2015

## Message from the Chair



Lynn Boyd

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Thank you for your interest in the Biology Department at MTSU. What a great year for biology at MTSU! We moved into the new Science Building in August 2014 (see the special fall 2014 issue of *BioUpdate*). We finally have the facilities to match our exceptional teaching and research capabilities. In addition to the new building, there are many other great things going on in our department.

This past year, many other departments at MTSU and the University, as a whole, experienced declines in enrollment. However, the Biology Department saw a 9.5% increase in the number of majors. This is attributable to the excellent instruction and service provided by faculty and staff. Many thanks to all for this impressive growth.

The department family is also growing with new babies on the scene. Baby Delaney was born to Dr. Erin McClelland and Dr. Moses Prabu. Baby Ada was born to Dr. Ashley Morris and her husband, Chris. We are so happy for those families.

Dr. Alicja Lanfear was hired as a new instructor. We are thrilled to have somebody with her experience and expertise teaching anatomy and physiology courses.

Last year, Dr. Matthew Klukowski was promoted to full professor and Dr. Chris Herlihy was tenured and promoted to associate professor. Congratulations to both on this major accomplishment.

The department continues to excel in many areas. Our external funding and publication numbers are growing each year. As mentioned above, the number of majors is increasing. We are developing a strategic plan that will serve as a guide in the coming years. The plan will allow us to build on our strengths and take advantage of opportunities that exist in the realm of biology. Look for the strategic plan to be posted on the departmental website by the end of 2015.

This is my third year as chair of the department. It is a delight to work with the MTSU Biology Department. I am enormously grateful to our fabulous office staff. Our department is extremely fortunate to have such a dedicated and competent staff.

I encourage you to read this issue of *BioUpdate* and learn about the many interesting things going on with our faculty, students, and alumni.

Lynn Boyd



# Tracking through an Indonesian Rainforest on a Fulbright

by Siti N. Hidayati

From February to July 2014, I was honored to spend time in my home country of Indonesia conducting research on *Rafflesia arnoldii*-the world's largest single flower (up to 1 meter diameter)-under a Fulbright Senior Scholarship. When I was an undergraduate student at Gadjah Mada University (Yogyakarta, Indonesia) and later a master's degree student at the University of Kentucky, I worked on the life cycle of *R. patma*. Last year, I returned to take up a population study working with my colleague Dr. Agus Susatya at the University of Bengkulu.

The parasitic plant genus *Rafflesia* is restricted to tropical Southeast Asia. The plants are often called "corpse flower" not to be confused with titan arum (*Amorphophallus titanum*) that gives off a rather unpleasant smell. From my own experiences, the smell from a *Rafflesia* flower isn't too displeasing. *Rafflesia* owes its name to Sir Thomas Stamford Raffles, a British explorer, statesman, historian, and founder of Singapore. *Rafflesia* is a national natural treasure in Indonesia, symbolized on T-shirts and collectibles, and it contributes to ecotourism.

All *Rafflesia* have unusual growth: no leaves, stems, true roots, or green photosynthetic tissue and a flower seen only outside its host plant, a vine (*Tetrastigma*) in the grape family. Growing from tiny seeds (<1 mm), a bud swells through the bark of *Tetrastigma* and grows to the size of a large cabbage head before it finally opens for 4–5 days after several months. The life cycle of *R. arnoldii* from seed to seed spans 3.7–5 years. How the seeds get into the host and germinate and how seedlings start growing is still unknown.

Most *Rafflesia* sites are small and contain few flowers. The plant's long-term survival is seriously in question as tropical rain forests fall to timbering, plantations, and housing developments and as the climate changes. *Rafflesia*'s biology also lends itself to potential extirpation: reliance on a single host genus, high bud mortality, rare pollination events (flowers not opening simultaneously, populations having one sex), long flower development, and highly fragmented populations. Propagation has been unsuccessful, though there is hope with the recent flowering of *R. patma* at the Bogor Botanical Garden using grafting techniques. Thus, habitat preservation is an essential part in the conservation of *Rafflesia*.

In Bengkulu, some populations of *R. arnoldii* are along the main roads in relatively flat areas heavily visited by tourists. Others are deep in the forest, requiring hours-long hikes on steep slopes. For those who want to see *R. arnoldii*, keep in mind the leeches that are along the way, especially during the rainy season. Yet, seeing the blooming *Rafflesia* will certainly leave a long-lasting memory and be a once-in-a-lifetime experience.

During my time in Bengkulu, approximately 20 populations of *R. arnoldii* were visited to establish long-term monitoring plots. Three other sites visited were first observed about 10 years ago and, at that time, they contained a large number of buds and flowers. Today, these sites are no longer with us.

The mystery is that we do not know what happened to the plants in these populations since the host vines are still present and there are no signs of disturbance. The long-term plots will be visited every year to better understand the population dynamics of *R. arnoldii* in relation to a changing climate and other environmental disturbances. Only in this way will we get a handle on the long-term survival of populations, which is vital for the preservation of this fascinating plant.



**Siti sitting beside a *Rafflesia arnoldii* bud that is beginning to open in Sumatra, Indonesia, March 2014**





# Featured Faculty Member: Elliot Altman



Elliot Altman was born in Dallas, TX and attended Westbury Senior High School in Houston. His parents were very accomplished. His father was a student of Latin and Greek and received a perfect score in English on the SAT. Elliot says he never needed a dictionary while growing up! His mother was a concert pianist. She also has a photographic memory, a trait that Elliot wishes he had inherited.

In 1979, Elliot received his bachelor's degree in zoology and, the next year, his bachelor's in chemistry from Texas A&M University. He received his Ph.D. in molecular genetics in 1991 from the California Institute of Biology. His dissertation was "Characterization of the SecB protein, a chaperone that facilitates protein secretion in *Escherichia coli*." Elliot was a postdoctoral fellow at the University of Utah (1990–1994) and then moved to the University of Georgia as an assistant professor in the Department of Microbiology in 1994. Eventually, he became director of the Center for Molecular Bioengineering at the University of Georgia, a position he held from 1999 to 2010 before coming to MTSU. Elliot has been teaching the Molecular Genetics course (BIOL 4450/6450), as he also did at the University of Georgia. It is a course that he says most people don't want to teach because of the intensive laboratory preparation involved. However, those experiments are the types that his research lab does every day, so he doesn't mind prepping the lab.

Elliot was hired as the director of the Molecular Biosciences Ph.D. program. Under his direction, the program has grown each year. Today there are 30 students working to achieve their doctorates. Elliot's laboratory has three main research interests: the production of industrially important chemicals using metabolic engineering, exploring natural products as a source of new nutraceuticals and pharmaceuticals, and the development of new or improved peptide therapeutics. His research has made him the holder of 16 issued U.S. patents. Elliot is also director of the Tennessee Center for Botanical Medicine Research (TCBMR), which was highlighted in the spring 2012 issue of *BioUpdate*.



His research has taken him to various locations in Germany and China, where he has had the opportunity to see sights in both countries that most tourists do not get to see.

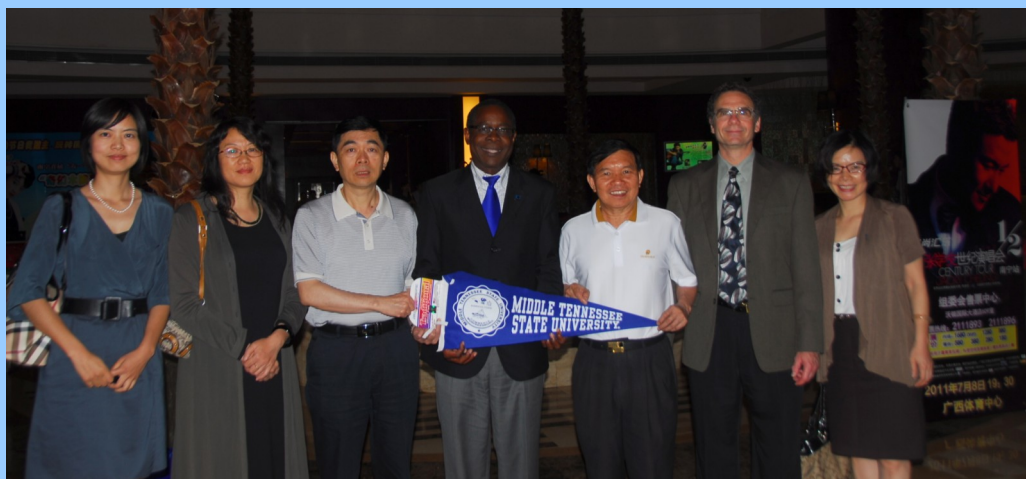
**Tennessee Center  
for Botanical  
Medicine Research**



Elliot says he is all about science all the time. His wife, Ronni, who has run his laboratory since 2002, is also a scientist, and most of their conversations at home have centered around science and the various projects being investigated in their laboratory. He credits Ronni for a great deal of his success in research. She has the innate ability to implement protocols and conduct experiments that have led to some very impressive results. He says that Ronni is one of the best scientists that he has known and has had the privilege to work with.

The Altmans have two daughters, Alyssa and Sarena. As for hobbies and interests outside the laboratory, Elliot says he is a rather boring person because his life is all about science. He loves research and loves instilling his passion for research in students.

When he wakes up on a work day, he can't wait to get to the laboratory to see what new results his team has discovered.



# Featured Faculty Member: Jeffrey Walck



Jeff Walck was born in Waynesboro in south-central Pennsylvania. He grew up in nearby Greencastle, where he attended Greencastle-Antrim High School. After high school, Jeff first attended Shippensburg University and then transferred to Cornell University and received his B.S. in biology with honors in 1989. After Cornell, he entered the University of Pittsburgh to start a Ph.D. in bird anatomy and systematics, but soon discovered he wanted to work on plants. He then spent a year as the flora of Pennsylvania intern at the University of Pennsylvania and Academy of Natural Sciences in Philadelphia. Jeff spent summers working for the Nature Conservancy as a field botanist searching for populations of rare plants.

Jeff went to graduate school at the University of Kentucky, where he received his Ph.D. in 1998. His dissertation was “Comparative Autecology of the Narrow-Endemic *Solidago shortii* and Two of Its Geographically-Widespread Congeners: An Investigation into the Causes of Plant Rarity and Endemism.” During his time at UK, Jeff met and married Dr. Siti Hidayati, a plant ecologist and tropical biologist (see the story about Siti’s research on page 2). After receiving his doctorate, Jeff completed a one-

year postdoctoral fellowship in the lab of Dr. Dan Crawford, studying molecular systematics at the Ohio State University. In the fall, 1999, Jeff began teaching at MTSU.

Jeff has taught Exploring Life (BIOL 1030), General Biology (BIOL 1120), Seminar on Environmental Problems (BIOL 3070), General Ecology (BIOL 3400), Senior Seminar (BIOL 4200), Conservation Biology (BIOL 6460) and Graduate Seminars (BIOL 6650, 6660). Along with teaching, Jeff has maintained a rigorous research program involving both undergraduate and graduate students. To date, he has mentored eight graduate students who have received their degrees.

Jeff’s early research at MTSU mostly focused on (1) seed dormancy and germination of various plants, (2) the conservation ecology of cedar glade plants and exotic plants, and (3) the evolution and biogeography of seed dormancy among North American–Asian disjunct plants. As part of his research on cedar glade plants, Jeff helped start the Center for Cedar Glade Studies, a component of the Department of Biology.

His research today has shifted to understanding how climate change will affect plant regeneration from seeds. This encompasses basic aspects (e.g., effects on germination) as well as applied aspects (e.g., design of *ex situ* seed banks and restoration of projects). His research program has ongoing projects in Australia (smoke germination), India (Himalayan plants), Sri Lanka (mangroves), Japan (*Viburnum*), and China (grassland species). He is starting research projects in Indonesia and in South Africa, both focusing on climate change. He is collaborating on another project with Chicago Botanic Garden, University of Wyoming, and University of Melbourne (Australia), examining germination traits and genetic/environment interactions and incorporating the information into predictive models on geographic ranges of species. To date, Jeff has published 67 papers in peer-reviewed journals (about 40 while at MTSU). Some of these journals include *Nature*, *Global Change Biology*, *Annals of Botany*, *American Journal of Botany*, *Seed Science Research*, *Castanea*, *AoB PLANTS*, *Journal of the Torrey Botanical Society*, *Plant Species Biology*, *Australian Journal of Botany*, *International Journal of Plant Sciences*, *Canadian Journal of Botany*, *Annals of the Missouri Botanical Garden*, and *Journal of Biogeography*.



**Siti, Edwin and Jeff beside a Titum arum (*Amorphophallus titanum*) in Cibodas Botanical Garden, Java, Indonesia, May 2014**



# Featured Faculty Member: Jeffrey Walck (*cont.*)



**Jeff and Siti at Yanchep National Park, Southwestern Australia, June 2014**

years in Australia and two months in Beijing. Jeff has served as an invited scientist in Australia, China, Taiwan, South Korea, Japan, and Indonesia. He and Siti have also visited the United Kingdom, Poland, Germany, Singapore, and Mexico.

Jeff and Siti have a son, Edwin, who has gotten a tremendous education in different cultures due to all the traveling his family has done. Edwin began his travel experiences at the age of two months, when he ventured out with his parents to collect data from field plots. Even today, he helps in the lab and field. Not many children get the opportunities to travel and experience other countries as Edwin has. Even with all this experience in field and lab research, Jeff and Siti say that, currently, Edwin does not want to be a biologist!



**Jeff, Siti, and Edwin in Seoul, South Korea, November 2014**

**Jeff, Siti, and Edwin at the Great Wall of China**



# Grand Opening of the New Science Building





# Grand Opening of the New Science Building



Master of Ceremonies John Hood



President Sidney A. McPhee



Governor Bill Haslam



State Senator Bill Ketron



# Grand Opening of the New Science Building



TBR Chancellor John Morgan



Faculty Representative Tammy Melton



Student Representative Kenneth Ball



Ribbon-Cutting





# Department Logo Shirts and More

The department is selling shirts, backpacks, insulated lunch bags, coffee mugs, lanyards and stadium cups that sport the department logo. The shirts come in five styles: a light tan short-sleeve or long-sleeve T-shirt with the logo on the upper-right front and an enlarged color logo on the back; a dark green short-sleeve or long-sleeve polo shirt with the logo on the upper-right front; and, a long-sleeve denim shirt with the logo on the upper-right front.

Several faculty and students have been seen wearing the shirts. The coffee mugs are white with the logo in blue on both sides (visible whether you are right- or left-handed). The stadium cups are 16 oz. blue plastic with a white MTSU Biology logo. The key lanyards are blue ribbed-polyester cord with a white MTSU Biology logo.

Come by and check out the merchandise in SCI 2044. You might even want to add your own personal flair by custom-ordering a T-shirt with your favorite color combination. T-shirts can be ordered in short or long sleeves. We can special-order hoodies (including RealTree camo).

Prices are as follows (cash only):

T-shirts	Short-Sleeve:	\$12.00	Insulated lunch bag:	\$8.00
	Long-Sleeve:	\$16.00		
Polo shirts	Short-Sleeve:	\$25.00	Drawstring backpack:	\$5.00
	Long-Sleeve:	\$28.00		
Heather gray pull-over hoodie: (printed like T-shirts)		\$25.00	Coffee Mugs:	\$3.00
			Stadium Cups:	\$1.00
			Key Lanyards:	\$2.00

All items can be purchased (cash only) in the department office from Virginia McKnight (615 -898-2291) or by email from Becky Elrod ([Rebecca.Elrod@mtsu.edu](mailto:Rebecca.Elrod@mtsu.edu)).





# MTSU Center for Environmental Education and Environmental Studies

by Cindi Smith-Walters

The 2013–2014 year was one of changes for the center. Following the name change, individuals from both the University and community voiced concern. One person from the local schools said, “I hate the thought of the good things the CEE has accomplished in the last 25 years to be ‘lost’ with the name change.” With that and comments like it in mind, consideration was given and the name has been revised to its final version, the MTSU Center for Environmental Education and Environmental Studies, CEES for short. CEES encompasses community, school, and informal education outreach; the TAMP program; the Center for Cedar Glades Studies; and a number of other efforts.

Although funding for full-time staff has been lost, the year has been a busy and productive one for Drs. Smith-Walters and Kelly. Dr. Kim Sadler has an article focusing on her work with the Center for Cedar Glades on page 13 of this issue of *BioUpdate*. A summer program with city schools, Discovery Center and Camp Marvel continued this past summer and, again, was a great success. New this year was the use of MTSU pre-service teachers to work with elementary students in the areas of water quality, habitats, natural history of raptors, and more. This program was covered in a pictorial spread in the local newspaper, the *Daily News Journal*. Dr. Kelly provided this resume-building opportunity for his students.

## COMMUNITY OUTREACH

In addition to the Camp Marvel experience, each summer the center works with local schools and Agricultural Extension to support the use of school gardens and outdoor classrooms. One of the most recent schools is the newly opened Overall Creek Elementary in Murfreesboro. In consulting with Don Bartsch, principal, an environmental focus was developed for the school that uses the land, creek, and retaining pond on the property to enhance teaching and learning. Before the school’s opening, Dr. Smith-Walters spoke to the Murfreesboro City School Board regarding the project and received approval.



**Overall Creek Elementary**



**Overall Creek Elementary first-grade STEAM (Science, Technology, Engineering, Art, and Math) unit kicks off with a book reading in the Overall Woods**



# CEES cont.

## TAMP (Tennessee Amphibian Monitoring Program)

TAMP, a statewide program to monitor amphibians, is sponsored by CEES and the Tennessee Wildlife Resources Agency. This year's accomplishments include, but are not limited to, the following:

- > A five-hour TAMP workshop was conducted at the University of Tennessee in Knoxville. Participants were given a slide and sound presentation that covered all 21 frog and toad species in Tennessee, and were then quizzed on their knowledge. This has been a popular workshop for the University of Tennessee and is incorporated into the UT Wildlife and Fisheries Science Fall Camp. A video montage from the 2013 camp can be seen at <https://www.youtube.com/watch?v=j1h8UdNjLYw&feature=youtu.be>.
- > The 2014 TAMP workshop for the University of Tennessee was conducted October 24, 2014.
- > TAMP continued work with the Tennessee Naturalist Program (TNP) in the 2013-14 year, conducting one program on TAMP and two programs on Tennessee amphibians. As a result of this collaboration, two TNP volunteers signed up and conducted TAMP routes this year. Former TNP volunteers for the Hampton Station and Flewellyn routes volunteered again for 2014.
- > Each new TAMP volunteer in 2013-14 was given a copy of the TAMP CD. This CD is a joint venture between TWRA and MTSU and includes recordings of all species that occur in Tennessee, hypothetical species, a section on similar-sounding species, and sound quizzes. This CD is available to educators statewide, including Tennessee Naturalist Program participants.
- > As in previous years, all TAMP data has been entered into the NAAMP (North American Amphibian Monitoring Program) database and a GIS-based TAMP database.
- > An integrated database containing all TAMP data from 2004 to 2014 was completed. 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.



**Barking Treefrog *Hyla gratiosa*** (© 2014 Robert English Leaps; used with permission)

## BOTANY AND MICROBIOLOGY

This past year, the CEES has had a very able intern, Shannon Smith, who has worked on a website with information and a series of laboratory activities using medicinal plants to teach biology concepts. Shannon has experience with the TCBMR (Tennessee Center for Botanical Medicine Research) at MTSU and was a perfect individual to bring the two centers together through the development of lessons specifically for grades 9-12 biology educators. These lessons can be used also by home-school audiences, informal educators, and introductory college-level students. The website contains lessons, supplements, links to lectures and videos, and guides for experiments that correlate to a standard curriculum. They can be used as stand-alone lessons or as a unit of study. Exciting for educators is that all activities use materials that are inexpensive and reliable. Directions for assembling the scientific equipment is included and materials can be easily found at local home improvement stores, grocery stores, co-ops, or online. In brief these lessons:

- \* focus on grade 9-12 biology
  - \* include lectures & videos to highlight concepts
  - \* foster experiential learning through teacher-led activities
- (cont.)

- \* provide instructions for equipment construction, cover such topics as organism interactions, genetic concepts, Chi square analysis, and a wealth of cellular concepts.

This QR code opens the site, or you can go to the center site to find a link.



## GRADUATE STUDENT SUMMER RESEARCH

Several MSE (Math and Science Education) doctoral students in biology worked through the summer on a variety of research projects including assessment of a statewide informal education program that gets inner-city youth into nature for a day, a few days, a week, or more. Great Outdoors University (GOU) is funded by the Tennessee Wildlife Federation and has not had a formal assessment done. Angelique Troelstrup developed a report for GOU, suggested ways to evaluate and assess the program, and developed draft rubrics and surveys. David Owens continued his research in evaluating Tennessee State Parks' (TSP) Junior Ranger program that occurs statewide each summer in several state parks. Additionally, the data collected by State Parks on a pilot program in a Tennessee elementary school was reviewed. Reports on both were written and provided to TSP. Mary Ellen Lohr had previously collected data on the use of technology in elementary science teacher preparation and, working in conjunction with Angelique, was able to assess and process those data. The project resulted in a presentation at a regional meeting and will likely lead to a publication.

## PUBLICATIONS, POSTERS AND PRESENTATIONS

Smith-Walters, as both a faculty member and codirector of the center, continues to be active in state and national organizations including board membership in the Tennessee Academy of Science and the Tennessee Environmental Education Association (TEEA). At the TEEA state conference, she presented two sessions, one of which was with an MSE doctoral candidate, Sandra Lampley. At the Tennessee Science Teachers Associa-

tion, she presented two different sessions with another MSE student, Heather Barker, and one with David Owens. In addition, several book chapters were published, one of which, with Heather Barker, was on research done in BIOL 3000, a course to prepare elementary teachers to teach science. The chapter, "Pre-service Teachers' Self-Efficacy and Attitudes toward Learning and Teaching Science in a Content Course" can be found in *Cases on Research-Based Teaching Methods in Science Education*. Other book chapters include, "Get Up, Get Out, Find Out!: Exploring Nature with Field Guides" in *Developing Environmental Awareness in Children: A Nature Studies Guide for Parents and Educators* and, "Diversity of Life" in *Passing the State Elementary and Middle School Proficiency Tests: Essential Content for elementary and middle school (4-8) Science Teachers*. In press is the chapter "Using Visual Data with Pre-service Science Teachers: From Awareness to Application" in *Application of Visual Data in K-16 Science Classrooms*. Dr. Smith-Walters collaborated with a number of individuals on journal articles and other publications, including one with a local assistant principal and doctoral candidate Christa Campbell and articles with former MTSU students.

Presentations this past year include those done by Dr. Kelly on behalf of Population Connection and TEAMS (Tennessee Educators of Aquatic and Marine Science). Dr. Smith-Walters conducted presentations and workshops mentioned above, but also worked with MSE students Jeffery Bonner and David Owens to conduct teacher training at the statewide Tennessee Association of the Gifted conference.

The Center continues as a sponsor of the statewide Tennessee Naturalist Program (TNP): <http://tnnaturalist.com/>. Dr. Smith-Walters serves as treasurer and an instructor. TNP is a series of classes that introduces the natural history of Tennessee to adults. Graduates join a critical corps of TNP volunteers providing education, outreach, and service dedicated to the appreciation, understanding, and beneficial management of natural resources and natural areas in their communities. TNP teaches Tennesseans about the natural world, inspires the desire to learn more, instills an appreciation of responsible environmental stewardship, and channels volunteer efforts toward education of the general public and conservation of natural resources. The program continues to grow,



adding chapters across the state and working on in-depth Tier II classes on specific topics planned for the near future. TNP has been the subject of a number of articles including one this past year in *Tennessee Conservationist* magazine.

CEES is in a rebuilding phase that will include relocation to Davis Science Building when renovations there are complete. Until then, the center will continue its good work reaching out to teachers, youth leaders, students, and the general public to keep our environment healthy and help make responsible, informed environmental decisions.

If you have questions about the center or would like to be involved in some way, please contact codirectors, Padgett Kelly at [jpkelly@mtsu.edu](mailto:jpkelly@mtsu.edu) or Cindi Smith-Walters at [cindi.smith-walters@mtsu.edu](mailto:cindi.smith-walters@mtsu.edu).

The Center for  
**Cedar Glade  
Studies**

Middle Tennessee State University



by Kim Cleary Sadler

**Save the dates May 1 and 2, 2015!** Come and celebrate cedar glades! Plan to attend the Annual Elsie Quarterman Cedar Glade Wildflower Festival May 1 and 2, 2015, at Cedars of Lebanon State Park. The weekend opens on Friday afternoon, May 1, with the 9<sup>th</sup> Annual Research Roundtable followed by an informational evening program at 7 p.m. and toe-tapping bluegrass music for the general public. Saturday events begin early with a morning bird-watching hike, followed by hourly informative natural history programs and guided hikes out to the glades throughout the day. The Saturday evening programs will have you either hooting or croaking, depending on your preference for the “owl prow” or “frog frolic.” If you are interested in attending the Research Roundtable or the Wildflower Festival and need more information, please contact Jeff Walck at [jeffrey.walck@mtsu.edu](mailto:jeffrey.walck@mtsu.edu) or Kim Sadler at [kim.sadler@mtsu.edu](mailto:kim.sadler@mtsu.edu).

**Cedar Glade Resources.** The Center for Cedar Glade Studies is in the Fairview Building, Room 202-D, but will relocate with the Center for Environmental Studies to Davis Science Building next year. For those of you interested in teaching about cedar glades, the Cedar Glade Educator Activity Guide, Flatrock Glade Plant Guide, and DVD are great sources of information. Also available are the Cedar Glade Endemic Plants poster, Cedar Glade pamphlet, and *A Visit to the Limestone Glades* DVD. For any of these resources, contact Kim Sadler at [kim.sadler@mtsu.edu](mailto:kim.sadler@mtsu.edu) or the Center for Cedar Glade Studies at [gladecenter@mtsu.edu](mailto:gladecenter@mtsu.edu). Electronic copies of the plant guide, educator guide, and videos are available on the Center for Cedar Glade Studies website, [www.mtsu.edu/glade-center](http://www.mtsu.edu/glade-center). Walker Library is maintaining a digital collection of theses, dissertations, and other works related to cedar glades. Visit the following link to view these items: <http://digital.mtsu.edu/cdm/landingpage/collection/cedar>.

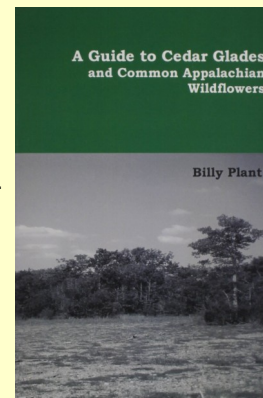
For more reading about cedar glades, former graduate student Billy Plant published *A Guide to Cedar Glades and Common Up-land Wildflowers*. A copy of the book can be purchased from Amazon.

## News from the 2014 Elsie Quarterman Cedar Glade Weekend.

The 8th Annual Research Roundtable was held at Cedars of Lebanon State Park, organized by Dr. Jeff Walck and facilitated by Dr. Vince Cobb. On Friday afternoon, more than 25 people representing academia, state and federal agencies, and NGOs attended the Roundtable.

On Friday evening, Rita Venable talked about butterflies of Tennessee. Author of the recently released *Butterflies of Tennessee: Field and Garden*, she shared highlights from her book and spoke about butterflies of Tennessee.

On Saturday, a beautiful May day provided a great opportunity to enjoy glade hikes organized by Kim Sadler and led by Drs. Kurt Blum and Tom Hemmery, Billy Plant (M.S. '12), Roger McCoy (TDEC, director, Natural Areas Program) and John Froeschauer  
(cont.)



# Cedar Glades Studies

(State Parks, Middle Tennessee naturalist). Melissa Turrentine led a large group of families through the smaller glades surrounding the newly renovated Nature Center recently completed by Buddy Ingram, ranger at the park. Linda Robinson (aunt of the Department of Biology's Dr. Brian Robertson) did a session on gardening with native plants; her team of Wilson county gardeners transformed the outdoor area behind the nature center with native plants.

Several speakers gave updates on glade management or current research.

Brian Bowen, TDEC Natural Areas Program administrator	Update on management plans in the barrens and glades
Ashley Morris, MTSU	Development of microsatellite markers for <i>Astragalus bibullatus</i> and <i>Dalea foliosa</i> , and long-term plans
Bill Wolfe, USGS	Stones River National Battlefield hydrology study
Vince Cobb, MTSU	Rattlesnake behavior at Flat Rock Cedar Glades and Barrens
Michael Rhoades, MTSU	Spatial autocorrelation reveals positive relationship between soil depth and species richness in Mid- dle Tennessee's cedar glades

**In Memory.** Vanderbilt professor emerita Dr. Elsie Quarterman died peacefully in her sleep in June at age 103. The cedar glade festival weekend is named for her. After retirement she continued to work as an advocate for the conservation of Tennessee land and was instrumental in early decisions about land purchases by the Tennessee Nature Conservancy. Her nephew, John Quarterman, has a blog with a collection of stories about Dr. Quarterman.

[www.okraparadisefarms.com/blog/elsie](http://www.okraparadisefarms.com/blog/elsie)

**Former students of Dr. Quarterman gathered at the Elsie Quarterman Wildflower Festival to celebrate her 100<sup>th</sup> birthday.**

**Front row, left to right: Carol Baskin (University of Kentucky), Elsie Quarterman, Gail Baker (Florida Natural Resource Division). Back row, Jerry Baskin (Univ. of Kentucky), Tom Hemmerly (MTSU). Photo used with permission from Ann Quarterman.**

## Fall 2014 Graduate Student Reception





# NSF TRIAD GK-12 Group Visits Santiago, Chile

Drs. Tony Farone, Mary Farone, and Kim Sadler traveled over the Andes to Santiago, Chile, as part of their NSF TRIAD GK-12 graduate training grant to provide international science communication and research experiences for biology and MOBI graduate students (Eric Vick, Andrew Trivette, Patrick Havlik, Rachel Lytle, Chris Davis, Paola Molina, Corbett Ouellette, Nick Chamberlain, and Katie Sampuda, with Wilmer Rivera and Keyla Hidalgo from the University of Puerto Rico). Students met with National Academy of Science member Dr. Jorge Allende from U. Chile Medical School; biology education researchers from Pontificiate University of Chile, Santiago; salmon aquaculture scientists from Pontificiate University of Chile, Valparaíso; and marine biologists and ecologists from Pontificiate University of Chile Marine Research Station Estación Costera de Investigaciones Marinas (ECIM) at Las Cruces.



**MTSU and UPR graduate students at the marine station**

ogists to design their Honors thesis projects. The students will then spend three months at ECIM conducting research with their mentor in Chile and with Dr. Mullen as their thesis advisor. A former GK-12 GF, Rachel Lytle, will also travel with the students and conduct biology education outreach in schools in the Las Cruces area. Rachel is currently teaching biology at Brentwood High School. Graduate Fellows (GFs) will also give a presentation on the TRIAD program to education officials at the U.S. Embassy in Santiago and at the University of Talca.

During visits to Chile, our GFs have worked with three high schools in Santiago: the St. Vincent de Paul-sponsored Ozanam School, Liceo de Aplicacion, and Lastarria Liceo. Our fellows conducted microbiology and biotechnology laboratory activities with students and collected genetic trait data in their Tennessee classrooms; Chilean teachers collected data from their students during the year. Nick Chamberlain (GF) compiled the data and presented it to the students in Santiago. Additionally, as part of our science education/cultural exchange with Chile, the science teacher at Ozanam School, Carolina Sepulveda, visited MTSU and gave a presentation on the teacher education system (*cont.*)

Dr. Mary Farone gave a research presentation to faculty and students at the marine station entitled “Novel Bacteria that Infect the Nuclei of Eukaryotic Hosts.” A memorandum of understanding was signed between MTSU and the director of ECIM, Dr. Sergio Navarette, to create a study abroad opportunity for MTSU Honors biology students. Honors biology professor Dr. Dennis Mullen will travel with two Honors students, Gabrielle Armour and Brooke Fitzwater, to Chile with us this spring (2015). Additional funding for Honor students’ travel was provided by Dr. Mullen and by the Honors College. They will spend their spring break meeting and working with marine biologists and ecol-



**Mary Farone and Paola Molina conducting soil microbiology activity to identify antibiotic producing bacteria**



# NSF TRIAD GK-12 Group Visits Santiago, Chile



**Doctoral students Nick Chamberlain and Wilmer Rivera conducting genetic trait activity that was also conducted in Tennessee high schools. Nick presented the results in Chile, comparing the two populations.**

**Rachel Lytle and an Ozanam student take a selfie**



**Paola Molina working with students from St. Vincent de Paul Ozanam School**



**TRIAD GK-12 GFs and PTs (L-R): Jacob Sanders, Andrew Trivette, Carolina Sepulveda, Patrick Havlik, Pamela Stewart (Central Magnet High School), Tamela Hunt (Stewart's Creek High School), Heather Corbin (Central Magnet), former GF Rachel Lytle (Brentwood High School)**



**View from the Marine Research Station. In the 1980s one km of Pacific coastline was protected, and the research station was built and has been renovated over the past five years. Our students and faculty will be some of the first to stay in newly constructed dormitories.**



## From the lab of Andrew Brower



After almost two years at MTSU, postdoc Ivonne Garzón departed to a position as postdoctoral research associate at the California State Collection of Arthropods (the systematics unit of the California Department of Food and Agriculture), where she will be working on the phylogenetics of lacewings. The Brower lab will miss Ivonne's antics as well as her

scholarship. Ivonne's research has resulted in two published papers, one submitted paper, one paper currently in revision, and two papers in preparation, all related to an NSF project on the quaternary history of Amazonia. Also, she attended meetings and workshops in French Guiana, Finland, Brazil, Argentina, and Raleigh, North Carolina.

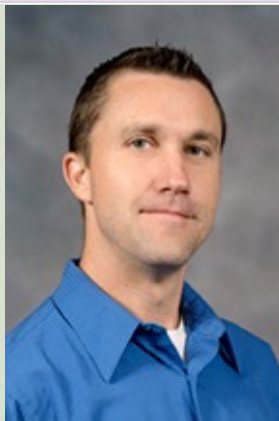
Graduate student Jennifer Benetti-Longhini has been awarded a Fulbright scholarship to travel to Brazil. She will be down there in February, for eight months, to collaborate on butterfly DNA projects with colleagues André Freitas and Karina Silva Brandão.

Andy Brower recently attended an NSF-sponsored workshop called "Assembling, Visualizing, and Analyzing the Tree of Life—Next Generation Phenomics" at Biosphere 2 in Oracle, Arizona as a guest senior scientist. In addition, Andy has been elected to the council of the Willi Hennig Society and was invited by Nashville Opera to give a public lecture about tropical butterflies in conjunction with their production of *Florenzia en el Amazonas*.

## From the lab of Grant Gardner

Grant Gardner was recently awarded a three-year, \$438,000 NSF DRK-12 grant as co-investigator in association with PI Tom Cheatham (director, MTSU Tennessee STEM Education Center) and co-PI Leigh Gostowski (coordinator, MTeach Program).

The team will design and develop a series of research-based curricula for high school biology teachers on topics that students regularly struggle with on end-of-course exams. The project will then use the collaboratively designed curricula during professional development for biology teachers across counties in Middle Tennessee. Dr. Gardner is the research lead on the project and will be collecting evidence for the efficacy of teachers' implementation of the instructional strategies, as well as the impact of the instruction on student learning.



## From the lab of Alicja Lanfear

### Recent Publications

Ann H. Ross, **Alicja K. Lanfear** and Ashley B. Maxwell. "Testing the Validity of Radiographic Comparisons in Positive Identifications." Final Technical Report. National Institute of Justice Award 2010-DN-BX-K214. September 30, 2014.



### In Review:

Ann H. Ross, **Alicja K. Lanfear**, Ashley B. Maxwell. "Establishing standards for minimum number of concordant features in radiographic comparisons for positive identifications." *Journal of Forensic Radiology and Imaging Corresponding*.

### Recent Presentations:

2015. AB Maxwell, AH Ross, **AK Lanfear**. "The Utility of Radiographs of the Proximal Femur in Positive Identifications: Establishing a Standard and Minimum Number of Concordant Points." American Academy of Forensic Sciences Annual Meeting, Orlando, Florida.

2015. Special Session Co-chair, "Young Forensic Scientists Forum 20th Anniversary: The Past, the Present, and Our Future (S2)." American Academy of Forensic Sciences Annual Meeting, Orlando, Florida.

2014. **AK Lanfear**. The Institut für Deutsche Ostarbeit (IDO), "Using Anthropometric Data to Gain an Appreciation of the Polish Population Before, During, and After World War II." Invited speaker to the symposium "World War II Anthropology: Austrians and Germans in Poland; Japanese in Asia; Anthropological Research and the Search for Survivors." American Association for the Advancement of Science Pacific Division Annual Meeting, Riverside, CA.

2014. Special Session Co-chair, Young Forensic Scientist Forum. "The World of Forensic Science: The Future of Education and Research (S2)." American Academy of Forensic Sciences Annual Meeting, Seattle, Washington.  
(continued on next page)

## From the lab of Alicja Lanfear (cont.)

### Grants:

2014 **National Institute for Standards and Technology Summer Undergraduate Research Fellowship** for Brooke T. Morgan, \$9,500  
*Research Topic:* An NIST interlaboratory study on the present state of DNA mixture interpretation with Dr. Michael Coble and Dr. Pete Valone.

### Volunteer/Community Service:

2015-2016 **Young Forensic Scientist Forum**  
 American Academy of Forensic Sciences  
 Bring-Your-Own Poster Session chair  
**Duties:** Coordinate (review, select presenters, and schedule) the YFSF poster session.

2015 **tnAchieves:** Rutherford County, Blackman High School mentor

2014-2015 **Young Forensic Scientist Forum**  
 American Academy of Forensic Sciences  
 breakfast session chair **Duties:** Coordinate (review, select presenters, and schedule) the YFSF breakfast session.

2013-2014 **Young Forensic Scientist Forum**  
 American Academy of Forensic Sciences  
 secretary co-chair **Duties:** Assist the secretary; YFSF newsletter contributions to the AAFS newsletters.

2014 **American Association for the Advancement of Science Pacific Division (AAAS-PD)**  
 Volunteer judge for student presentations, University of California, Riverside

2014 **tnAchieves:** Davidson County, Antioch High School mentor

2014 **Mentorship in Motion Pre-Plenary Session**  
 American Academy of Forensic Sciences  
 Captain, physical anthropology section

Taylor Norris using the microscope in the Nelson Lab



**Observing the mitochondrial quality-control process in single living cells.** Excitation of a mitochondrially-targeted photosensitizer (KillerRed-Mito; red), causes localized mitochondrial damage. Parkin proteins (YFP-parkin; green) are recruited specifically to damaged regions of the mitochondrial network, initiating their removal by the mitophagy/autophagy system.

## From the lab of David Nelson

The Nelson lab has been investigating how changes that occur in the brain during the onset of Parkinson's disease (PD) alter cellular signaling and mitochondrial dynamics in dopaminergic neurons.

During summer 2014, the lab hosted undergraduate FirstSTEP and URECA research teams to produce and validate inducible cell lines expressing a-synuclein, the protein that accumulates in PD-affected neurons. The URECA team presented this work at the MTSU Summer Research Poster Session. The tools produced by both teams will be used by current Nelson lab undergraduates to determine whether the formation of a-synuclein microfibrils or insoluble aggregates alter inflammatory NF-kB signaling in the brain, contributing to the loss of dopaminergic neurons.

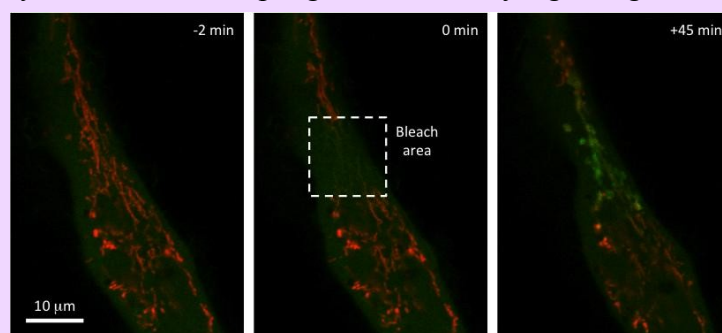
Using funds from an MTSU FRCAC award, the Nelson lab recently added an incubation system to the Zeiss

LSM700 confocal microscope. This will enable them to continue their work on the impairment of mitochondrial quality control (mitophagy) in PD, among other projects.



**FirstSTEP Team.** (L-R) Martha Fonseca, Olivia Slayton, Sarah Ragsdale, Taylor Norris, and Alexis Johnson.

The Nelson lab is pleased to announce that Lauren Heusinkveld, a current Honors student co-supervised by Drs. McClelland and Nelson, was awarded a Sigma Xi Research Award to investigate the effect of *Cryptococcus neoformans* on macrophage inflammatory signaling.





## From the lab of Kim Cleary Sadler



The move to the main campus from the Fairview Building has been an exciting change. Although there is something to be said for being off campus, it is fantastic to be doors away from my colleagues and a short walk from the classes I teach. Several projects from the past few years have come to completion, and new projects are underway.

I wanted to share with you some findings from a project that ended last year after six years of collaboration with Murfreesboro City Schools and Cannon and Rutherford County Schools called the Earth, Energy, and Civilization (EEC) project (NSF-Young Scientists Academy, \$789,039). This project involved more than 650 middle school students in after-school STEM (science, technology, engineering, and math) experiences. Some of the reported outcomes were that youth **strongly agreed** (4.46 out of 5) that they **enjoyed the program**; **88%** of youth said that they would **maybe or definitely attend again**. Average responses for questions asking whether the program made youth **feel excited to do and learn more science at school** (4.1 out of 5), helped youth feel **prepared to do well at science in school** (4.2), and made youth want to **do and learn more science in their free time** (3.6) showed the importance of these types of programs. More than **54%** of youth named a **specific experiment/project/lab** they completed when asked what they thought was the most fun thing about the program. The after-school teachers showed significant increases in their feeling of preparedness on leading a class of students using investigative strategies and encouraging students' interest in STEM. After participating in the program, teachers more strongly disagreed with the statement "I find it difficult to explain to students why STEM experiments work." In other words, it seems as though participating in the program made them more confident explaining to students why STEM experiments work. I want to give special thanks to Dr. Tom Cheatham for the use of TSEC (Tennessee STEM Education Center) office space for the final two years of the project.

EEC youth measure cicada wing length to complete a lab on statistics (activity developed by Dr. Steve Murfree, M.S. '84)



EEC Family Science nights brought learning science home; this family is conducting an experiment with a drop on a penny.

Aerospace students engaged EEC youth with flight simulator experiences and then an actual flight over their homes.



Working with elementary students at the McFadden School for Excellence on several projects has been great fun and an inspiration. The school transformed a portion of the schoolyard into an outdoor classroom that includes gardens maintained by each grade, a pond, chickens, bird feeders, a bee watch station, and study areas. Fourth-grade students experimented with composting with Katlyn O'Connor (M.S. student) and fifth-graders explored a unit on soil with lessons from Jennifer Parrish (MSE-Ph.D. student). As a component of the soils unit, students conducted a research project; poster judges included Rachel Lytle and Patrick Havlik (M.S. student). Jennifer's study examined student understanding about the nature of science. Her work has generated interest within the science education community, and she has presented preliminary findings at the School Science and Mathematics and the Association for Science Teacher Education meetings.

Second-grade students planned and planted a cedar glade garden with glade plants rescued from the roadside. The glade habitat is a source of STEM learning for the students as their teacher, Cindy Cliché, integrates teaching about cedar glades into many lessons. I lead hikes at Flat Rock Cedar Glades in the fall and spring to show students the seasonal difference and variation in plants. Students conduct research on a selected glade plant and present this in a multimedia presentation during open house at the school. This work has been accepted for publication in Sadler K, Cliché C, & Lasater M. (Pending Publication). "Bringing the Outside in: Learning Ecology through the Study of Native Plants." *Science and Children*.



*McFadden student and soil sample experiment*

*(continued next page)*

## From the lab of Kim Cleary Sadler (cont.)

Shifting gears to high school, Rachel Lytle has been working for the past two years on high school students' perception of science, scientists, and science careers through the NSF GK-12 TRIAD project. Although preliminary analysis of survey data shows little change in student perception after a year of biology with or without a graduate student in the classroom, there are several other factors we are examining. Rachel accepted a position teaching biology at Brentwood High School this past fall and has incorporated the TRIAD model of student research projects into her curriculum.

High school student Cooper Thome contacted me last fall about working with him on a project for his senior thesis. Dr. Tony Farone suggested examining microbial populations on tree leaves. As a component of the TRIAD program, Rachel Lytle mentored Cooper. His work, "The effect of river proximity on the microbial phyllosphere of the Sycamore tree, *Platanus occidentalis*" was accepted for presentation at the 2014 Tennessee Junior Academy of Science Symposium.



Cooper Thome, Central Magnet School, Kim Sadler, Rachel Lytle

A portion of Zena Tenenbaum's thesis, "A Qualitative Study of the Great Smoky Mountain Institute at Tremont's Citizen Science Youth Internship Program" (August 2013) was published in Jenkins L, Walker R, Tenenbaum Z, Sadler K, & Wisser K. 2014. "Why the Secret of the

Great Smoky Mountains Institute at Tremont Could Influence Science Education-Connecting People and Nature." In Mueller M & Tippens D (Eds.), *Ecojustice, Citizen Science and Youth Activism: Situated Tensions for Science Education*.

The past several years I have involved my large BIOL 1030 nonmajor lecture sections in ecological restoration projects on the Stones River Greenway and Stones River National Battlefield. The course has been designated as an experiential learning (EXL) class and includes field work. Beyond the positive impact their work has had on the environment, student responses to this experience have been favorable, in that, 99% of students think I should continue to do this with future classes.

## From the lab of Erin McClelland

The McClelland lab is currently full of students working on various projects. Four students (1 master's, 3 undergraduates) are working to create genetic knock-outs in strains of *Cryptococcus neoformans* to determine if the gene they are studying is involved in pathogenesis. Two students (1 masters, 1 undergraduate) are working on how *C. neoformans* alters NF-kB signaling in macrophages (in conjunction with Dr. David Nelson). Two students (1 volunteer, 1 undergraduate) are studying a few chemicals to determine how they inhibit growth of *C. neoformans*. Two students (1 PhD, 1 undergraduate) are studying gender susceptibility differences in *C. neoformans* (i.e., why 70% of patients with cryptococcal meningitis are male). Finally, one undergraduate student is screening a *C. neoformans* knock-out library for strains with reduced virulence using *C. elegans* (in conjunction with Dr. Lynn Boyd).



Kim Sadler and some of her students with some invasive plants removed at McFadden's Ford, Stones River National Battlefield



Michael Rhodes (M.S. student) with Kim Sadler's class at Fortress Rosecrans, Stones River National Battlefield



## From the lab of Mohamed Salem



Mohamed (Moh) Salem teamed with Dr. Tim Leeds, a scientist at USDA, and Brett Kenney, a professor at WVU, have received a \$500,000 grant to develop state-of-the-art genomic markers to enhance fish breeding through identifying desirable/undesirable genes. The award came from the USDA/National Institute of Food and Agriculture (NIFA). Genomic selection approaches

will be applied in breeding superior-performing USDA fish breeding stocks for improved muscle growth and quality traits. The team is using cutting-edge genomics technologies to search for the genes/markers, including SNP-chips, whole-transcriptome and exome sequencing. These technologies will be applied to improve production of rainbow trout, the second-most cultivated fish in the U.S. The goal is to make the aquaculture more profitable for farmers and make the fish taste better. Dr. Salem's students, Bam Paneru and Rafet F. Al-Tobasei, recently presented the newly developed technology at the International Plant and Animal Genome meeting in San Diego.

## From the lab of John DuBois



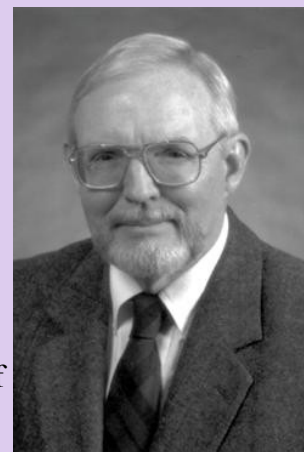
John's M.S. student, Misty Griffith, successfully defended her thesis, "Isolation and Identification of Possible Atrazine Degradation Products from Middle Tennessee Soils," and graduated in December 2014. Misty is currently a faculty advisement coordinator/biology instructor/lab technician at Motlow State Community College in McMinnville.

With the move to the new Science Building, John has taken on the duties of managing the department's greenhouse. The greenhouse supplies plants for both General Biology courses and the Plant Physiology course. The greenhouse also maintains space for research and class projects.

This past fall semester, John joined the TCBMR (Tennessee Center for Botanical Medicine Research) and is collaborating on the Ginseng Initiative.

## From the lab of Charles McGhee

This spring, Dr. McGhee is completing preparation of a large research collection of species in the arachnid order Phalangida (Opiliones) to be donated to the American Museum of Natural History. The collection was started in 1967 and contains specimens primarily from the Appalachian region from Alabama to Maryland. It contains a large number of specimens in the genera *Leiobunum* and *Hadrobunus* and has been used in systematic revisions of those groups. He and curators at the AMNH have been working on the details for the transfer.



## From the lab of Mary and Tony Farone



Mary Farone's M.S. student, Brock Arivett, graduated this past year. His work, "Characterization of inosine-uridine nucleoside hydrolase (RihC) from *Escherichia coli*" was published in *Biochim Biophys Acta* in 2014. Mary's Honors thesis undergraduate student, Cameron Crawford, was accepted into the doctoral program at UAB.

Anthony Farone was the graduate advisor for Eric Vick, who completed his dissertation research, "Characterization of the Human Inflammatory Response to *Gardnerella vaginalis*." Eric was accepted into the University of Tennessee College of Medicine. Eric's work was published in the *Journal of Reproductive Immunology* in 2014. Mary's undergraduate students, Krista Huff and Kenneth Brooks, were coauthors.

Anthony Farone was the graduate advisor for Eric Vick, who completed his dissertation research, "Characterization of the Human Inflammatory Response to *Gardnerella vaginalis*." Eric was accepted into the University of Tennessee College of Medicine. Eric's work was published in the *Journal of Reproductive Immunology* in 2014. Mary's undergraduate students, Krista Huff and Kenneth Brooks, were coauthors.

The Farones each have two Ph.D. students and two M.S. students and numerous undergraduates working in the laboratory. Their research interests continue in the area of medical microbiology and they have been working with members of the Biology and Chemistry Departments as part of the Tennessee Center for Botanical Medicine Research (TCBMR) to characterize antimicrobial and anti-inflammatory activities from traditional Chinese medicine.

## From the lab of Ashley Morris



It has been an active year for the Morris lab. In summer 2014, M.S. student Rayne Leonard was awarded an NSF EAPSI Fellowship for research in Beijing. She was hosted by Dr. Zhiduan Chen at the Chinese Academy of Sciences, State Key Laboratory of Systematic and Evolutionary Botany, Institute of

Botany. In addition, M.S. student Kevin Trostel received a paid research internship at the Insect Behavior and Chemical Ecology Lab at Tennessee State University's Nursery Research Center in McMinnville. Kevin contributed to work presented at the 2014 national meeting of the Entomological Society of America in Portland, Oregon.

Ashley, now in her fourth year as a faculty member at MTSU, was elected vice president of the Association of Southeastern Biologists (ASB) in April of 2014. She also presented her research at both ASB 2014 in Spartanburg, South Carolina, and at the national meeting of the Botanical Society of America (Botany 2014) in Boise, Idaho.

Ashley received internal and external funding for projects ranging from conservation genetics to digitization of biological collections. Current funding sources include the MTSU Foundation Special Projects Award,

MTSU FRCAC, U.S. Fish and Wildlife Service, and the National Science Foundation. She is also involved in several collaborative projects on the importance of small herbarium collections in research and curriculum development.

### Recent Publications:

Ashley published four papers in 2014, either as primary or coauthor, including two with MTSU graduate\* and undergraduate\*\* students:

Shaw J, Shafer H, Leonard R\*, Kovach M, Schorr M, Morris AB. 2014. "Chloroplast DNA sequence utility for the lowest phylogenetic and phylogeographic inferences in angiosperms: Tortoise and hare IV." *American Journal of Botany* 101: 1987-2004.

Hieb EE, Nelson DH, Morris AB. 2014. "Oviductal eggs from road-kill turtles provide a novel source of DNA for population studies of the Alabama red-bellied turtle." *Conservation Genetics Resources* 6: 837-839.

Hieb EE, Nelson DH, Morris AB. 2014. "Genetic monitoring reveals loss of microsatellite diversity in a breeding population of the endangered Alabama red-bellied turtle." *Endangered Species Research* 23: 253-261.

Morris AB, Millsaps NK\*\*, Mason KQ\*\*, Howell JS\*, Speer JH. 2014. "Mature beech (*Fagus grandifolia*; Fagaceae) are persistently clonal in coves and beech gaps in the Great Smoky Mountains." *American Journal of Botany* 101: 381-388.



**Displays in the new  
Science Building**







## TAS holds 124<sup>th</sup> Annual Meeting

The 124<sup>th</sup> meeting of the Tennessee Academy of Science was held Friday, November 20, 2014, at Walters State Community College in Morristown. Biology Department representatives serving on the TAS executive board and standing committees are Dr. Kim Sadler, president 2014; Dr. Brian Robertson, member-at-large; Dr. Bob McGhee, fellows committee; Dr. Cindi Smith-Walters, education. Please speak with one of them if you are interested in serving on a TAS committee.

The College of Basic and Applied Sciences will host the 2015 TAS meeting. Make plans to participate now. The call for proposals will be in August, and September 30 is the deadline for submissions. Tentative meeting date is Friday, November 20.

Department of Biology papers and posters presented at the 2014 meeting are listed below with student authors or coauthors designated with an asterisk (\*).

### Science and Math Teaching Technical Session

Jeffery W. Bonner\* and Mary Ellen Lohr\*, "Addressing the Need for Students to Think Critically about Science."

### Cell and Molecular Posters

Dianna J. Prince\*, Ashley Elliott Cole\*, and Elliot Altman, "Using Missense Mutants to Determine Amino Acids That Are Crucial to the Correct Folding of  $\beta$ -galactosidase."

Mahsa Jajedi\*, Ashley Elliott Cole\*, and Elliot Altman, "Using Missense Mutants to Test the Ability of Hsp60 and Hsp70 Chaperones to Rescue Misfolded Proteins."

### Science and Math Teaching Posters

Kim Sadler, Patrick Havlik\*, Jacob Sanders\*, Andrew Trivette\*, Paola Molina\*, Anthony Farone, Mary Farone, "Building International Partnerships in Tennessee and Chilean High Schools through the NSF GK-12 Program at Middle Tennessee State University."

Kim Sadler with  
URECA scholars  
Meg Danish, Elsa  
Bennett, and Thuy  
Huynh



### Zoology Posters

Jeffrey White\*, Melissa Pompilius\*, and Robert Fischer, "Incidence and Thermal Biology of the Invasive *Daphnia lumholtzi*."

Meg Danish\*, S.E. Bennett\*, Melissa Pompilius\*, and Robert Fischer, "Identifying Zooplankton Communities in Southeastern Estuaries and Reservoirs."

Thuy Huynh\*, Melissa Pompilius\*, and Robert Fischer, "Thermal Tolerance of Invasive and Native *Daphnia* Species from the Alabama River Delta."

Kristen Riggs\*, Brian Miller, and Chris Meffley, "Olfactory Stimulations in Captive *Neofelis nebulosa* at the Nashville Zoo at Grassmere, Tennessee."

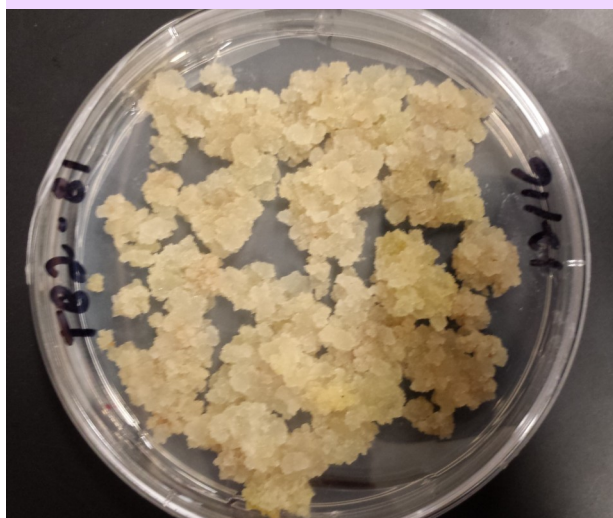
(Photographs provided by Melissa Pompilius)



Jeff White, URECA scholar

# The TCBMR Ginseng Initiative

The TCBMR (Tennessee Center for Botanical Medical Research) has many different ongoing research projects at the University, one of which is the Ginseng Initiative. Shannon Smith, a Ph.D. (MOBI) student under Dr. Elliot Altman, and Matt Fuller, an Honors College biology undergraduate, have been working on aspects of this project. They have developed various cell lines cultured from explants; determined the effects of several hormones, environmental stimuli, and nutritional mixes on tissue development; developed novel tissue initiation protocols; and are continuing to investigate a bioreactor system of tissue generation. Dr. John DuBois and former colleague, Dr. Bruce Cahoon, are lending their plant biotech experience to the initiative. Rajarshi Ghosh, a Ph.D. (MOBI) student, and Dr. Paul Kline (Department of Chemistry) have partnered to explore the chemical extraction and analysis aspects of important compounds. Dr. Steven Wright has developed a viral model to test the efficiencies of the extracts on immune response with Dr. Tony Farone and Erin Park, a Ph.D. (MOBI) student, also contributing to the investigation of immune responses of the compounds. Dr. Nathan Phillips (Agribusiness/AgriScience) has been assisting the project by exploring the possibility of hydroponic production methods for explant tissue sources. Also, the TCBMR has partnered with the MSPS program at MTSU with the addition of two interns, Jesse Werfel and Allison Phillips, to the Ginseng Initiative. The overall goal of this particular set of endeavors is the development of a commercially viable tissue culture process for the production of medicinal and research-oriented products from the *Panax quinquefolius* (North American Ginseng) plant.



**Ginseng  
root  
tissue  
callus**

Ginseng is a very popular over-the-counter supplement used to boost the immune system and was one of the first herbs from Traditional Chinese Medicine (TCM) to be widely utilized. The primary users are people suffering from colds or flu and people whose immune systems are suppressed, such as cancer patients. The annual world market for ginseng is just over \$2 billion, with a starting price of \$400 per pound for mature ginseng roots. The growth of ginseng as a cultivated crop represents a significant economic opportunity for the state of Tennessee.

The top three states for ginseng production are Kentucky, Tennessee, and North Carolina. For the past several years Tennessee farmers have been harvesting about 10,000 lbs. of ginseng root annually. A number of countries that grow ginseng have adopted the growth of cultivated ginseng as a cash crop. Canada is the prime example, and their farmers currently provide more than six times the amount that U.S. farmers do. Tennessee, with its abundant farmland, a great portion of which is well-suited for the growth of ginseng, should take advantage of the opportunity presented by the huge demand.

Even with the conventional eight-year time requirement for growing ginseng from planted seeds to mature roots that can be harvested, ginseng represents a phenomenal cash crop opportunity. If one considers all factors, including crop yields per acre and growth requirements, ginseng is worth a staggering \$340,000 per acre, while corn is only worth \$640 per acre.

The TCBMR is working with the state to better educate farmers about this incredible opportunity. Our research efforts focus on developing rigid scientific testing methodologies to better assess the potency of harvested ginseng roots, developing methods so ginseng can be rapidly grown via tissue culture in the laboratory, and assisting farmers who wish to grow ginseng as a cash crop.



**Ginseng tissue callus sprouting roots**



# 2014-2015 Graduate Teaching Assistants

For the 2014-2015 academic year, the department is providing support to 27 M.S.-level and 20 Ph.D.-level graduate students who serve as graduate teaching assistants (GTAs). Twenty-two of these students have received undergraduate degrees from colleges and universities other than MTSU. Twenty-two hold baccalaureate degrees in subjects other than biology (anthropology, biochemistry, biotechnology, botany, chemistry, clinical lab sciences, environmental science, history, mathematics and science studies, microbiology, plant and soil science, psychology, Spanish, wildlife and fisheries science, zoology). Five of these assistants have received baccalaureate or master's degrees from universities outside the United States. 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 nonmajors 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.

## MASTERS GRADUATE TEACHING ASSISTANTS

**Jon Ashely**, B.S., Biology, 2012, The State University of New York, Potsdam  
**JK Ridma Bandara**, B.S., Chemistry & Botany, 2010, University of Peradeniya, Sri Lanka  
**Sarah Barns**, B.S., Biology, 2010, Old Dominion University  
**Gale Beaubien**, B.S., Biology, 2014, Middle Tennessee State University  
**Jesse Chambers**, B.S., Biology, 2014, Middle Tennessee State University  
**Sade Dunn**, B.S., Biology, 2010, Middle Tennessee State University  
**Erin Floyd**, B.S., Anthropology, 2014, Middle Tennessee State University  
**Alexis Gross**, B.S., Biology, 2013, Middle Tennessee State University  
**Jennifer Hawthorne**, B.S./B.A., Biology/Spanish, 2013, Middle Tennessee State University  
**Amber Hills**, B.S., Environmental Biology, 2012, Tennessee Tech University  
**Alyssa Hoekstra**, B.S., Zoology, 2008, Auburn University  
**Brian Houck**, B.S., Wildlife and Fisheries Science, 2012, Tennessee Tech University  
**Sarah Kirkpatrick**, B.S., Biology, 2007, Mississippi State University  
**Victoria Kremer**, B.S., Biology, 2014, Middle Tennessee State University  
**Archana Krishnamoorthy**, B.S., Biotechnology, 2012, PES Institute of Technology  
**Opal Leonard**, B.S., Biochemistry, 2013, Middle Tennessee State University  
**Eric Limbird**, B.S., Plant and Soil Science, 2013, Middle Tennessee State University  
**Herschell Parker**, B.S., Psychology, 1973, Belmont University  
**Phillip Parsley**, B.S., Biology, 2012, Belmont University  
**Allison Phillips**, B.S., Biology, 2013, Middle Tennessee State University  
**Haley Pimental**, B.S., Chemistry, 2012, Middle Tennessee State University  
**Katherine Stefanski**, B.S., Biology, 2009, University of North Carolina, Chapel Hill  
**Deborah Knott-Thomas**, B.S., Botany, 1991, Brigham Young University  
**Jeremy Timbs**, B.S., Biology, 2012, Middle Tennessee State University



# 2014-2015 Graduate Teaching Assistants

**Kevin Trostel**, B.S., Plant and Soil Science, 2013, Middle Tennessee State University

**Jessica Vannatta**, B.S., Biology, 2012, Middle Tennessee State University

**Joseph Weiss**, B.S., Biology, 2013, Middle Tennessee State University



## Ph.D. GRADUATE TEACHING ASSISTANTS

**Heather Barker**, B.S., Mathematics and Science Studies, 2000, Southern Adventist University;  
M.S. Ed., Outdoor Teacher Education, 2004, Southern Adventist University

**Jonathan Logan Bowling**, B.S., Biology, 2013, Middle Tennessee State University

**Penny Carroll**, B.S., Biology, 2013, Middle Tennessee State University

**Nick Chamberlain**, B.S., Biology, 2009, Middle Tennessee State University

**Jacob Crigler**, B.S., Biology, 2008, University of Tennessee, Knoxville

**Chris Davis**, B.S., Biology and History, 2007, Middle Tennessee State University

**Chatoria Kent**, B.S., Biology, 2004, Middle Tennessee State University; M.S., Microbiology, 2008, Tribhuvan University, Nepal

**Mary Ellen Lohr**, B.S., Biology, 2001, Western Kentucky University; M.S., Biology, 2012, Western Kentucky University

**Thilina Fernando**, B.S., Clinical Lab Sciences, 2005, University of Asmara, Eritrea

**Yohannes Mehari**, B.S., Clinical Lab Services, 2005, University of Asmara, Eritrea

**Paola Molina**, M.S., Biology, 2012, Middle Tennessee State University

**Bam Paneru**, B.S., Microbiology, 2011, Tribhuvan University, Nepal

**Hyo Erin Park**, B.S., Biology, 2009, Middle Tennessee State University

**Jennifer Parrish**, B.S., Biology, 1998, Winthrop University; M.A., Interdisciplinary Science, 2007, University of Northern Colorado

**Melissa Pompilius**, B.S., Chemistry, 1998, Northern Arizona University; M.S., Biochemistry, 2001, University of Nevada, Las Vegas

**Katherine Sampuda**, B.S., Biology, 2011, Middle Tennessee State University; M.S., Professional Science, 2013, Middle Tennessee State University

**Megan Stallard**, B.S., Biology, 1999, Tennessee Tech University; M.S., Toxicology, 2005, Texas A&M College Station

**Jeannie Stubblefield**, B.S., Biology, 2011, Middle Tennessee State University

**Caleb Sutton**, B.S., Biology, 2011, Tennessee Tech University

**Angelique Troelstrup**, B.S., Psychology, 2000, Middle Tennessee State University; M.S., Quantitative Psychology, 2003, Middle Tennessee State University



# M.S. Theses Completed 2013-2014

The Biology Department graduated 13 students with the Master of Science degree in Biology during the May, August, and December 2013 ceremonies (11 of those were identified in the spring 2014 issue of *Bio-Update*) and four students in 2014. As of the December 2014 ceremony, the Biology Department has produced 354 master's theses. Nationwide, Middle Tennessee State University is a leader in producing master's-level graduates. Students, their graduation year, thesis titles, and faculty advisors are below. A list of all theses completed to date in the Biology Department can be found at <http://capone.mtsu.edu/jddubois/3230/theses.html> or on the Biology Community section of D2L.

- Flickinger, Dallas L.** 2013. "Intraspecific and Intragenomic Variation as Measured from the Dual Control Regions of the Western Cottonmouth, *Agkistrodon piscivorus leucostoma* Mitochondrial Genome." (Bruce Cahoon, advisor)
- Nordberg, Eric J.** 2013. "Thermal Ecology and Behavioral Activity in Hibernating Timber Rattlesnakes (*Crotalus horridus*)." (Vince Cobb, advisor)
- Arivett, Brock A.** 2014. "Site-Directed Mutagenesis and HPLC Analysis of Inosine-Uridine Nucleoside Hydrolase RihC of *Escherichia coli*." (Mary Farone, advisor)
- Griffith, Misty M.** 2014. "Isolation and Identification of Possible Atrazine Degraders from Middle Tennessee Soils." (John DuBois, advisor)
- Nolin, Spring G.** 2014. "Retention of Lead and Total Suspended Solids in Pervious Concrete." (Ryan Otter, advisor)
- Webb, Alison N.C.** 2014. "Interactions Between Innate Immunity, Steroid Hormones, and Body Condition in Female Fence Lizards (*Sceloporus undulatus*)." (Matt Klukowski, advisor)

# Biology Department Awards First Ph.D.'s in 2014

The Biology Department awarded its first Ph.D. degree at the August 2014 graduation. Three more doctorates were awarded at the December 2014 graduation. All four doctorates were in Molecular Biosciences.

- Khadka, Manoj.** 2014. "Biochemical and Bioinformatics Approach to the Study of Lipids and Their Biosynthetic Pathways in *Chromera velia* and *Vitrella brassicaformis*." (Jeffrey Leblond, advisor)
- Bhawana.** 2014. "Ultra-structural Anatomy and 3D Reconstruction of Plant Tissues and Organelles Using Transmission Electron Microscopy and Focused Ion Beam-Scanning Electron Microscopy." (Bruce Cahoon, advisor)
- Dodson, Vernon J.** 2014. "Taking the Heat: The Effect of Growth Temperature on Lipids of the Diatoms." (Jeffrey Leblond, advisor)
- Vick, Eric.** 2014. "Characterization of the Human Inflammatory Response to *Gardnerella vaginalis*." (Anthony Farone, advisor)

# Scholars Week Highlights Faculty and Student Research

Middle Tennessee State University held its annual Scholars Week March 17-21, 2014. The department presented 26 posters. Authors of these posters included 17 faculty members, 30 graduate students, and 11 undergraduate students.

Awards were given to the top three posters presented by graduate students and undergraduate students from each college. Five posters from the Department of Biology took home awards. The Lauren Whaley, Megan House, and Stephen Wright poster tied for second place in the undergraduate student division. The Cameron Crawford and Mary Farone poster won third place in the undergraduate student division. The Archana Krishnamoorthy and James Robertson poster tied for first place in the graduate student division. The Karen Maynard, Shannon Smith and Rebecca Seipelt-Thiemann poster tied for first place in the graduate student division. The Sade Dunn, Melissa Shelby, Fatimah Al Abbass, Fatmah Hani, and Mary Farone poster tied for second place in the graduate student division.

Faculty members involved in mentoring these students deserve credit for their time, effort and expertise in these research projects. The poster session was well attended by the University community. Many people from across campus saw the quality of research being conducted in the department. Congratulations to all authors for a job well done!

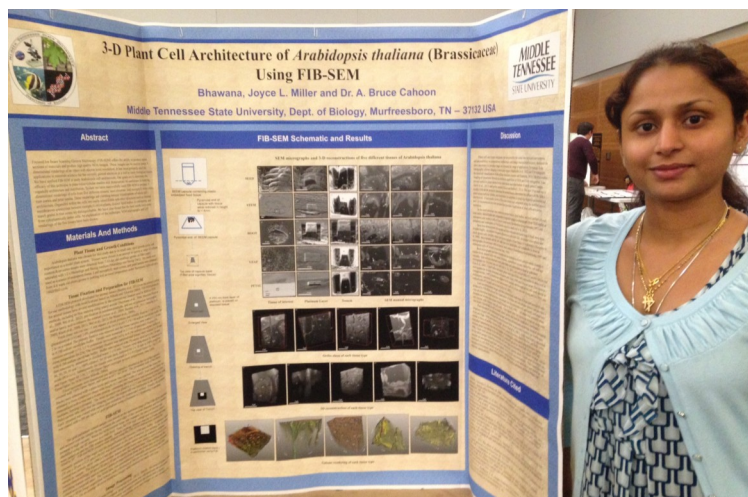
To see the entire Scholars Week program and abstracts from all posters and presentations, visit <http://www.mtsu.edu/research/scholarsWeek/>. Poster authors and titles from the Department of Biology are given below

## Faculty Presentations

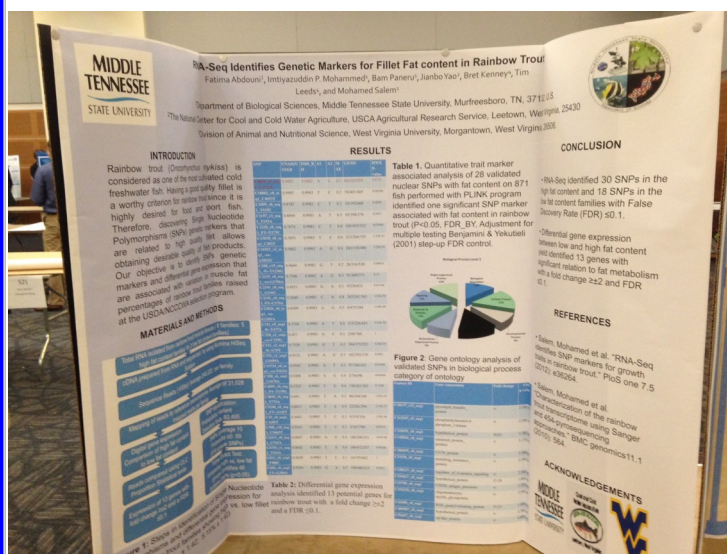
**Ali Ali**, Yniv Palti (USDA), Caird E. Rexroad (USDA), Jianbo Yao (West Virginia University), Gregory Wiens (USDA), Gary Thorgaard (Washington State University), **Mohamed Salem** presented “Characterization of Rainbow Trout (*Oncorhynchus mykiss*) Spleen Transcriptome and Identification of Immune-Related Genes.”

## Graduate Student Presentations

**Bhawana**, Joyce Miller (staff), **Bruce Cahoon** (faculty) presented “3-D Plant Cell Architecture of *Arabidopsis thaliana* (Brassicaceae) Using Focused Ion Beam-Scanning Electron Microscopy.”



**Fatima Abdouni**, **Bam Paneru**, **Imtiyazuddin Mohammed**, **Mohamed Salem** (faculty) presented “RNA-SEQ Identifies Genetic Markers for Muscle Fat Content in Rainbow Trout.”



**Heather Barker**, **Cindi Smith-Walters** (faculty), **Thomas Brinthaup** (Psychology) presented “Improving Attitudes and Self-Efficacy in a Life Science Course for Pre-Service Teachers.”



# Scholars Week cont.

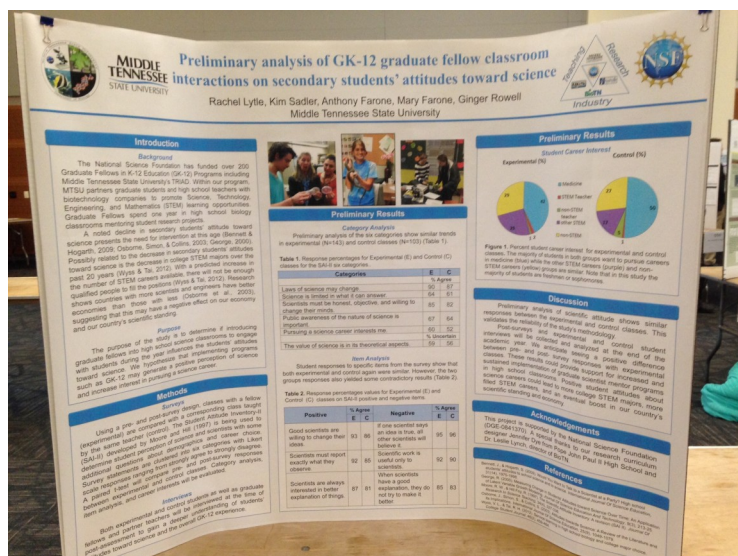
**Mahaguruge Thilina Fernando, Chris Herlihy** (faculty), **Jeffrey Walck** (faculty) presented “Roles of Local Adaptation and Pollinator Selection in the Maintenance of Flower Color Polymorphism in *Leavenworthia stylosa*.”

**Manoj Khadka, John Carter, Jeffrey Leblond** (faculty) presented “Comparative Study of Betaine Lipid Composition of Chromerids and Red Algae Using Electrospray Ionization Tandem Mass Spectrometry.”

**Jennifer Parrish, Kim Sadler** (faculty), Stephen Bartos (Educational Leadership) presented “Is Doing Knowing? Elementary Student Views About Scientific Inquiry.”

**Sade Dunn, Melissa Shelby, Fatimah Al Abbass, Fatmah Hani, Mary Farone** (faculty) presented “The Detection of Methicillin-Resistant *Staphylococcus aureus* on Printer Touchscreens and Keyboards.”

**Rachel Lytle, Kim Sadler** (faculty), **Anthony Farone** (faculty), **Mary Farone** (faculty), Ginger Rowell (Math) presented “A Preliminary Analysis of GK-12 Graduate Fellow Classroom Interactions on Secondary Students’ Perceptions of Science.”

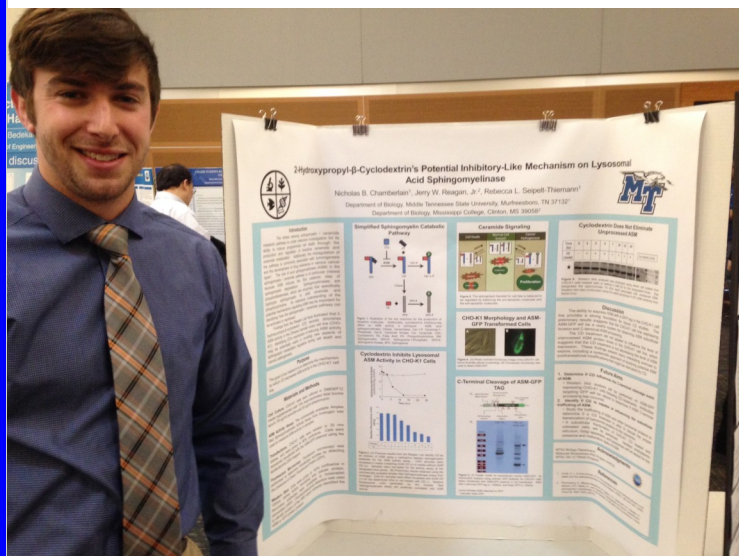


**Yohannes T. Mehari, Anthony L. Farone** (faculty), **Mary B. Farone** (faculty), Sharon G. Berk (Tennessee Technological University), John H. Gunderson (Tennessee Technological University) presented “Characterization of Two Novel Bacteria Infecting the Nucleus of Eukaryotic Cells.”

**Bam Paneru, Ashlin Harris** (undergraduate), **Rhett Layman** (graduate), Timothy D. Leeds (NCCCWA), Jianbo Yao (UWV), Brett Kenney (UWV), **Mohamed Salem** (faculty) presented “RNA SEQ Identifies Single Nucleotide Polymorphism (SNP) Associated with Muscle Yield and Shear Force of Flesh in Rainbow Trout.”

**Jeffery Bonner, Jeannie M. Stubblefield** (graduate), **Mary Farone** (faculty) presented “Effectiveness of a Guided Learning Tool in an Undergraduate Microbiology Laboratory Course.”

**Nicholas Chamberlain, Rebecca Seipelt-Thiemann** (faculty) presented “2-Hydroxypropyl-Beta-Cyclodextrin’s Potential Inhibitory-Like Mechanism on Lysosomal Acid Sphingomyelinase.”



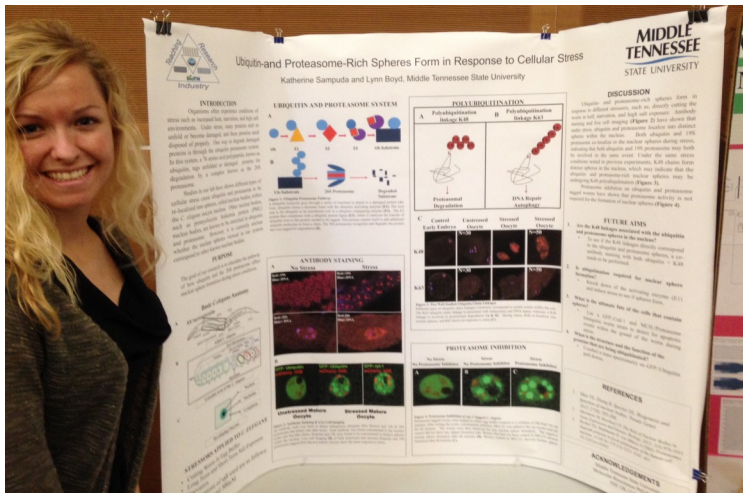
The next Scholars Week is  
**March 16-20, 2015**



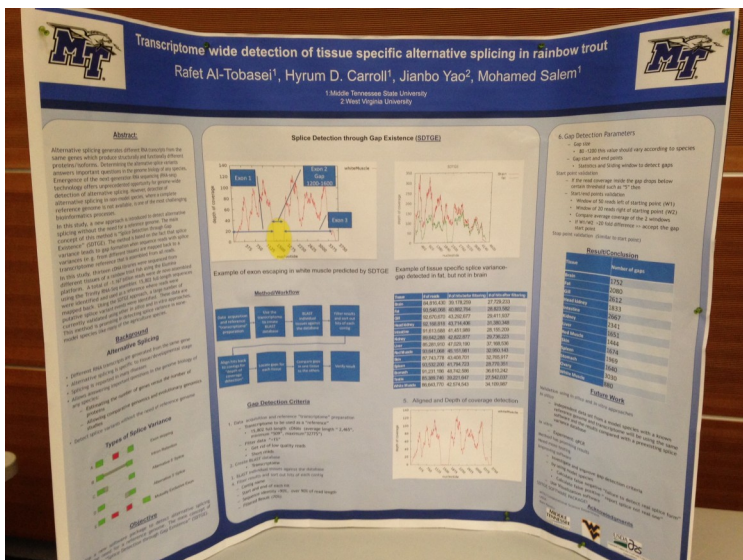
# Scholars Week cont.

**Corbett Ouellette, Kim Sadler (faculty), Anthony Farone (faculty), Mary Farone (faculty), Rachel Lytle (graduate), Nicholas Chamberlain (graduate), Eric Vick (graduate), Ashley Elliott-Cole (graduate), Paola Molina (graduate)** presented “TRIAD in Chile: Teaching, Research, and Industry Partnerships to Advance Global Scientific Understanding through the NSF GK-12 Program.”

**Katherine Sampuda, Lynn Boyd (faculty)** presented “Ubiquitin- and Proteasome-Rich Spheres Form in Response to Cellular Stress.”



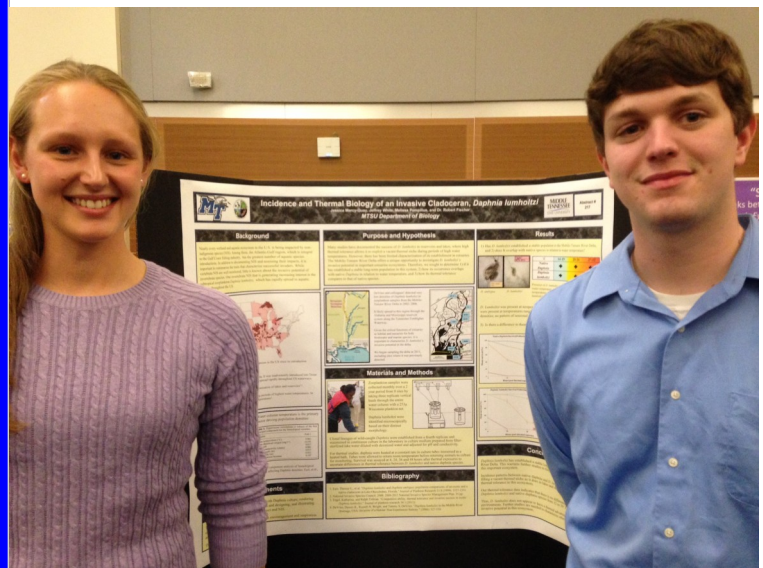
**Rafet Al-Tobasei, Mohamed Salem (faculty)** presented “Transcriptome-Wide Detection of Tissue-Specific Alternative Splicing in Rainbow Trout.”



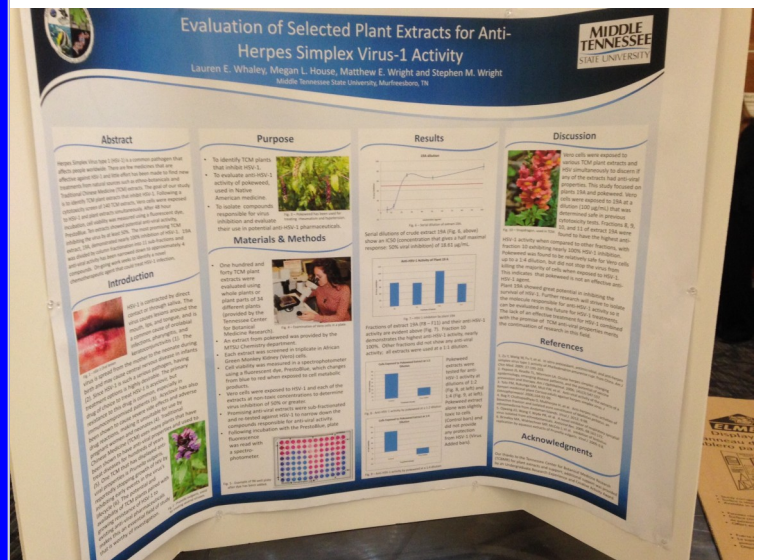
## Undergraduate Student Presentations

**Mohamed Seda, Jesse Chambers, Mohamed Salem (faculty)** presented “Whole Transcriptome Profiling of the Rainbow Trout Pineal Gland: RNA-SEQ Approach.”

**Jessica Marcy-Quay, Jeffrey White, Melissa Pompilius (graduate), Robert Fischer** presented “Incidence and Thermal Biology of an Invasive Cladoceran, *Daphnia lumholtzi*.”



**Lauren Whaley, Megan House (graduate), Matthew Wright (graduate, Chemistry), Stephen Wright (faculty)** presented “Evaluation of Selected Plant Extracts for Anti-Herpes Simplex Virus Activity.”

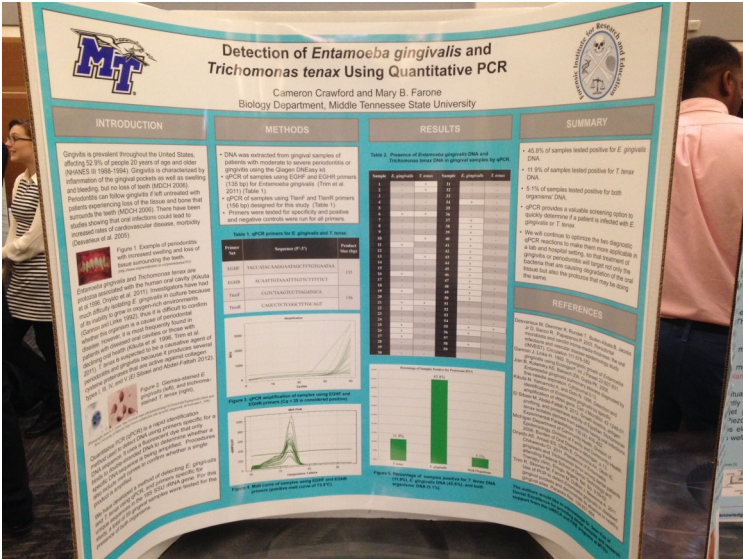




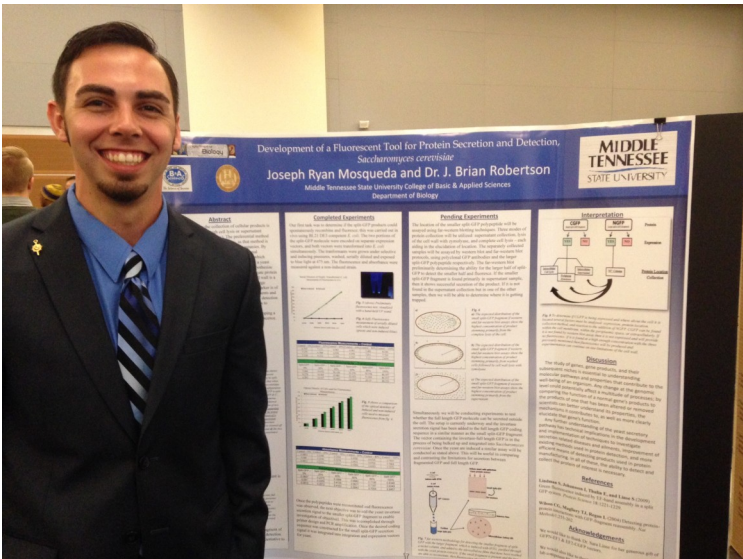
**Scholars Week cont.**

**Matt Brooks, Anthony Farone** (faculty) presented “*Gardnerella vaginalis*: Inflammatory Impact on Amniotic Cells and Immune Interactions.”

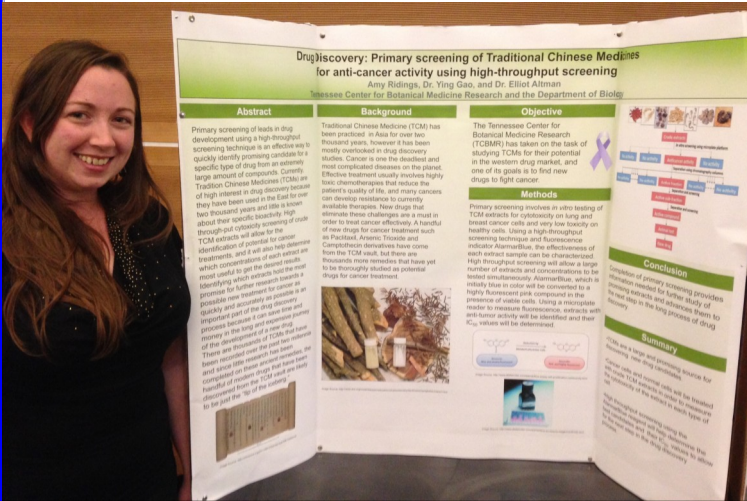
**Cameron Crawford, Mary Farone** (faculty) presented “Detection of *Entamoeba gingivalis* and *Trichomonas tenax* Using Quantitative PCR.”



**Joseph Mosqueda, Brian Robertson** (faculty) presented “Development of a Novel Fluorescent Tool for Protein Secretion and Detection, *Saccharomyces cerevisiae*.””

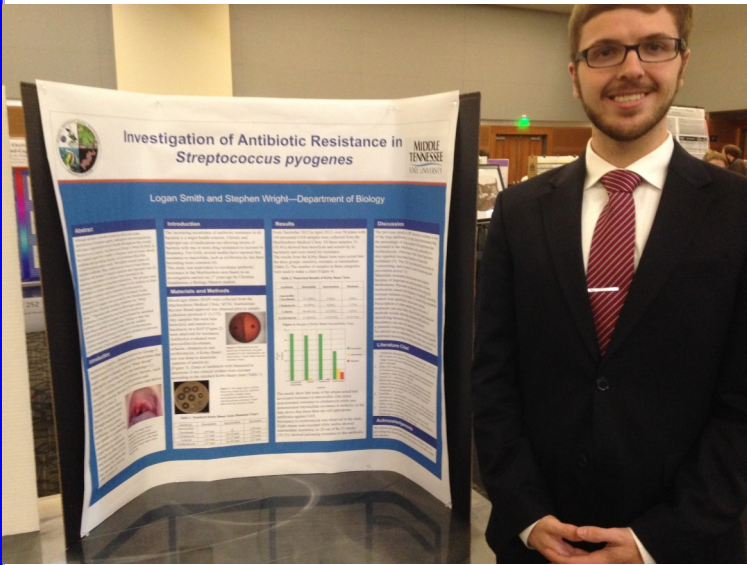


**Amy Ridings, Elliot Altman (faculty), Iris Gao**  
(faculty) presented “Drug Discovery: Primary Screening of Traditional Chinese Medicines for Anti-Cancer Activity Using High-Throughput Screening.”



**Archana Krishnamoorthy, James Robertson**  
(faculty), presented “Development and Investigation of  
a Dual-Color Luciferase Reporter in *Saccharomyces*  
*cerevisiae*.”

**Logan Smith, Stephen Wright** (faculty) presented  
“Investigation of Antibiotic Resistance in *Streptococcus pyogenes*.”



**Karen Maynard, Shannon Smith** (graduate), **Rebecca Seipelt-Thiemann** (faculty) presented “M1 Aminopeptidases: An Analysis of Phylogeny and Function.”

## 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 three full-time temporary and two adjunct faculty members. All five hold doctoral degrees.

These faculty are teaching Exploring Life, Human Anatomy and Physiology I and II, Comparative Anatomy of the Vertebrates, and Medical Botany. 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 in an ever-increasing number of course sections 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 involving graduate and undergraduate students. The department is forever grateful for their service.

### Full-Time Temporary Faculty

**Dr. Alicja Lanfear**, B.S., 2006, Cumberland University; M.S., 2008, MTSU; Ph.D., 2012 University of Tennessee, Knoxville. Teaching: Biology 2011 Anatomy and Physiology labs

**Dr. Christopher Brian Manning**, B.S., 1996; M.S., 1998, MTSU; Ph.D., 2003, University of Vermont. Teaching: Biology 2010/2011 Anatomy and Physiology I Lecture and Lab; Biology 2021 Anatomy and Physiology II Labs.

**Dr. Amy Massengill**, B.S., 1993, Stetson University; D.V.M., 1997, University of Florida. Teaching: Biology 2021 Anatomy and Physiology Lab; Biology 3021/5021 Comparative Anatomy of the Vertebrates Lab

### Adjunct Faculty

**Dr. Steve Edwards**, B.A., 1973, University of California, San Diego; Ph.D., 1980, University of California, San Diego. Teaching: Biology 2011 Anatomy and Physiology Lab

**Dr. Thomas Hemmerly**, A.M., 1955, Peabody College; Ed.D. 1964, Peabody College. Teaching: Biology 1030 Exploring Life and Biology and Biology 4400/6400 Medical Botany

## BioUpdate

Lynn Boyd, department chair ([Lynn.Boyd@mtsu.edu](mailto:Lynn.Boyd@mtsu.edu))  
John D. DuBois, editor ([John.Dubois@mtsu.edu](mailto:John.Dubois@mtsu.edu))

Produced by MTSU  
Department of Biology

Key contributors to this issue of *BioUpdate* are Elliot Altman, Tony Farone, Siti Hydayati, Virginia McKnight, Kim Cleary Sadler, Shannon Smith, Cindi Smith-Walters, and Jeffrey Walck.

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# Biology Department Scholarship Winners, 2014

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 each and every student recipient.

**Clay M. Chandler Outstanding Freshman Biology Award and Scholarship.** Awarded annually to an outstanding student in General Biology classes.

**Victoria Lay**

**Ralph E. Sharp Outstanding Sophomore Award and Scholarship.** Awarded annually to a Biology major of sophomore standing.

**Rachel Yates**

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

**Matthew Fuller**

**Peter I. Karl Outstanding Senior Award.** Awarded to a Biology major of senior standing who will graduate in May or August or who graduated in December.

**Cameron Crawford**

**Elliott Dawson/BioVentures Biotechnology Scholarship.** Awarded to a Biology major of junior standing or above who has taken or is currently enrolled in Biotechnology.

**Carly Duffy**

**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.

**Courtney Yarbrough      Kenneth Brooks**

**Maria de los Reyes Microbiology Scholarship.**

Awarded to a Biology major of sophomore standing or above who has completed Biology 1110, 1120, 2230, and 3250 by the spring semester, and has declared a concentration in Microbiology.

**Diamondie Wilson**

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

**Zachary Grimes**

**Kevin Driver Memorial Scholarship.** Awarded to a student of junior standing with an interest in organismal biology, physical therapy, or sports medicine.

**Joanne Tan**

**George Davis Scholarship.** Awarded to a nontraditional Biology major of sophomore standing or above.

**Prince Boakye**

**John D. DuBois Scholarship.** Awarded to undergraduate or graduate students to provide travel for paper presentations at scientific meetings.

**Alyssa Hoekstra**

**Mary C. Dunn Graduate Scholarship.** Awarded to support research efforts.

**Archana Krishnamoorthy**

**J. L. Fletcher Graduate Scholarship.** Awarded to a beginning Biology graduate student.

**Sarah Kirkpatrick**

**Charles Holland Biology Club Scholarship.** Available to students enrolled in the graduate program.

**Kevin Trostel**

**Sarah Barlow Scholarship.** Awarded to a graduate teaching assistant who plans to teach at the secondary or college level.

**Alyssa Hoekstra**

**Marion R. Wells Graduate Research Scholarship.**

Awarded to provide support for thesis research conducted during the summer.

**Sarah Kirkpatrick**

# Biology Department Scholarship Winners, 2014

**John M. Zamora Graduate Research Scholarship.** To provide support for expenses associated with thesis research.

**Sarah Barns**

**William H. Butler, Jr. Graduate Research Scholarship.** To provide support for expenses associated with thesis research.

**Brian Houck**

**Dennis Mullen Vertebrate Biology Aquatic Ecology Research Scholarship.** Awarded to graduate students engaged in research in vertebrate biology or aquatic ecology.

**Jessica Vannatta**

**Thomas Hemmerly Graduate Research Support Fund.** To provide travel and/or supplies necessary for thesis research.

**Sarah Barns**

**Brian Miller Graduate Research Scholarship.**

Awarded to support research of second-year graduate students conducting field studies on herpetology or biogeology in Tennessee.

**Jessica Vannatta**

**Mary Ann Harrison McClary and Richard E. McClary Scholarship.** Awarded every third year to an outstanding Biology major who is at least of sophomore standing.

**Noelle Anderson      Anna Neal**

## Incoming Freshman Scholarships 2013-2014

**Mary C. Dunn Freshman Scholarships.** Awarded annually to an incoming freshman Biology major. Given to the first- and second-place scorers on a departmental exam given in April.

<b>First Place:</b>	<b>Clayton Mitchell</b>
<b>Second Place:</b>	<b>Brooke Fitzwater</b>

**Patrick J. Doyle Freshman Scholarship.** Awarded annually to an incoming freshman Biology major. Given to the third-place scorer on a departmental exam given in April.

<b>Third Place:</b>	<b>Maleia Nelson</b>
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**Ellis Rucker Freshman Scholarship.** Awarded annually to an incoming freshman Biology major. Given to the fourth-place scorer on a departmental exam given in April.

<b>Fourth Place:</b>	<b>Andrew Connor Moss</b>
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Drone spotted in the atrium of the Science Building during fall semester!

## Let us hear from you...

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

Send us your name, MTSU degree/year, along with 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:

Biology Department, MTSU Box 60. Murfreesboro, TN 37132,

Fax: 615-898-5093

E-mail: [John.Dubois@mtsu.edu](mailto:John.Dubois@mtsu.edu)

