



BioUpdate

Biology Department • Middle Tennessee State University



George Murphy

**MIDDLE
TENNESSEE**
STATE UNIVERSITY

Message from the Chair

Over the past year, our department has experienced highs and lows. There have been many noteworthy accomplishments by faculty and students. Our faculty have been securing the outside funding necessary to maintain strong research programs and enhance classroom instruction. In just the past year, biology faculty received external funds totaling just over \$5 million. Combined with continuance funds and additional internal funds, total funding for the year was just under \$6.5 million. Be sure to read the article in this issue about the various funding sources. Faculty members authored or coauthored 18 national/international refereed publications. Dr. Jeff Walck and an Australian colleague published an opinion paper in the journal *Nature*, one of the two most prestigious science publications (the journal *Science* being the other). I believe this is the first *Nature* inclusion by an individual while employed at MTSU. We congratulate Jeff on this major achievement! Our faculty and students were again well represented at the MTSU Scholars Week poster session, with 33 posters from 15 faculty members, 13 graduate students, and 26 undergraduate students on display.

The master's program remains strong, now boasting more than 300 completed theses since its start in 1967. Although that represents an average of seven theses completed per year, our program has been graduating between 9 and 13 master's students per year since 2000. Three Ph.D. programs involving the department will begin in fall 2010. Degrees will be offered in Computational Science, Mathematics and Science Education, and Molecular Biosciences. Many faculty members are already taking active roles in these programs.

These accomplishments represent highs of the past year. However, the economic situation in Tennessee continues delaying construction of the new science

continued...



Scholars Week Highlights

Faculty and Student Research

The annual Scholars Week for 2009 was March 30 - April 3. Once again, the department was well represented, especially at the Friday poster session in Murphy Center. Thirty-three of the posters were from the Biology Department. Authors included 15 faculty members, 13 graduate students, and 26 undergraduate students. In addition, there were two posters representing centers on campus with ties to the department. **Kim Sadler** presented a poster for the Center for Environmental Education and the Center for Cedar Glade Studies and **Joyce Miller** presented a poster for the MTSU Interdisciplinary Microanalysis and Imaging Center (MIMIC).

Awards were given to the top three posters presented by graduate and undergraduate students from each of the five colleges. In the College of Basic and Applied Sciences, biology students swept the top three graduate awards and received second place in the undergraduate awards. Spring Gilson (1st place), Prashant Singh and Saffet Guleryuz (2nd place), and Justin Head (3rd place) received the graduate awards and Merranda Holmes received the 2nd place award for undergraduates. Congratulations to all five student authors of these posters!

Both the number of posters presented and the awards received demonstrate the high level of student research within the Biology Department. Faculty members mentoring these students deserve credit for their time, efforts, and expertise. The poster session was very well attended by the University community and people from across campus were able to see 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, along with abstracts from all posters and presentations, visit <http://frank.mtsu.edu/~research/scholar-week.html>. Poster authors and titles begin below.

Faculty Presentations

Michael Thompson and **Rebecca Seipelt** presented "Interaction of Lactoferrin with MMP-2 and Pro-MMP-2."

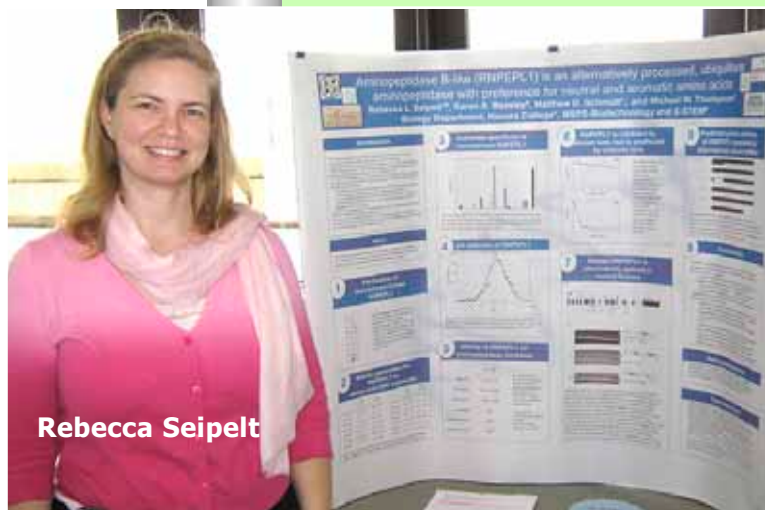
Rebecca Seipelt, **Karen Beasley** (graduate student), **Matthew Schmidt** (Chemistry), and **Michael Thompson** presented "Arginyl aminopeptidase-like 1 (RNPEPL1) Is an Alternatively Processed Aminopeptidase with Specificity for Methionine, Glutamine, and Citrulline Residues."

from the chair...

building. Although federal stimulus funds have helped soften the impact of state funding reductions, those funds will disappear in 2011. Economic forecasts continue painting a bleak picture and groundbreaking has not been scheduled. Still, faculty and students continue to do amazing things considering our cramped space and resources.

As always, I encourage you to keep in touch. We always enjoy meeting with alumni who return to campus. Feel free to e-mail me news of your career or other interesting information at gmurphy@mtsu.edu.

George Murphy

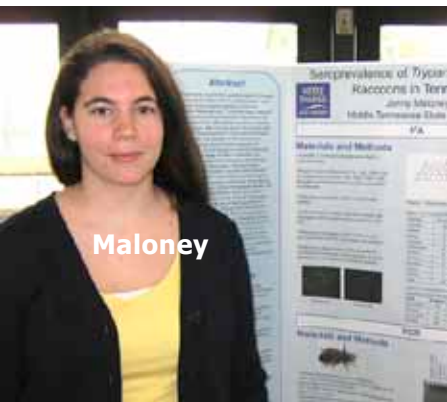


Rebecca Seipelt

Graduate Student Presentations

Jenny Maloney and **Anthony Newsome** (faculty) presented "Seroprevalence of *Trypanosoma cruzi* in Raccoons in Tennessee."

Gina Cullerton and **John Zamora** (faculty) presented "How to Build a Better Mouse Trap: Sanitation Issues in the Food Industry."



Maloney



Cullerton

Kyle Sykes and **Matthew Klukowski** (faculty) presented "Effects of Acute Temperature Change, Confinement, and Housing on Plasma Corticosterone in Water Snake."

Zena Tenenbaum and **Kim Sadler** (faculty) presented "A Qualitative Study of the Citizen Science Program at the Great Smoky Mountains Institute at Tremont."



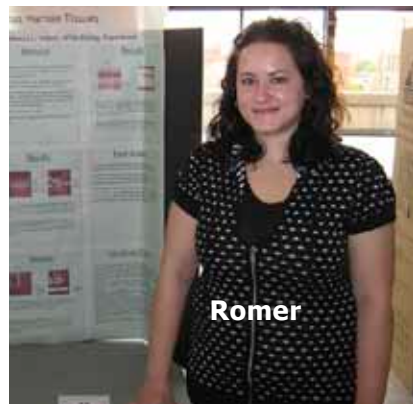
Tenenbaum

William Monroe and **Ryan Otter** (faculty) presented "Short-term and Long-term Effects of Kingston Fossil Coal Ash on Native Freshwater Mussels."

Carrie Romer and **Rebecca Seipelt** (faculty) presented "Laeverin and LTA4H mRNA Splicing in Normal and Cancerous Human Tissues."



Monroe



Romer



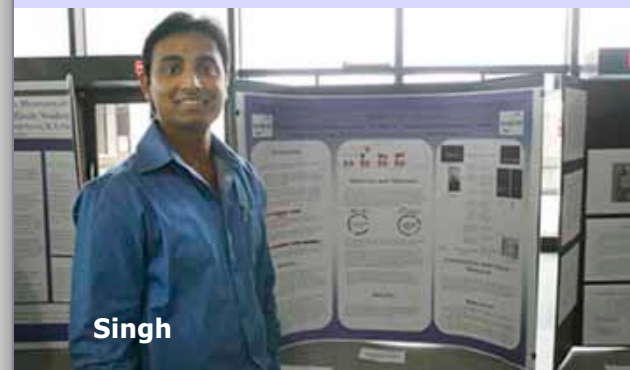
Cook-Shivers

Morgan Cook-Shivers and **Frank Bailey** (faculty) presented "Lead Accumulation and ALAD Activity in Ground Beetles (*Coleoptera: Carabidae*) Found on or near Dove Hunting Fields."



Gilson

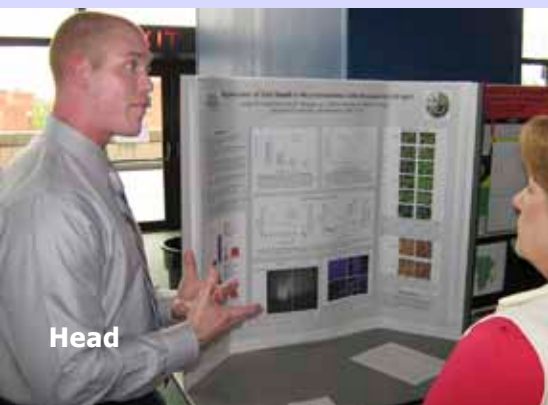
Spring Gilson and **Ryan Otter** (faculty) presented "Pollution Filtration Capabilities of Pervious Concrete."



Singh

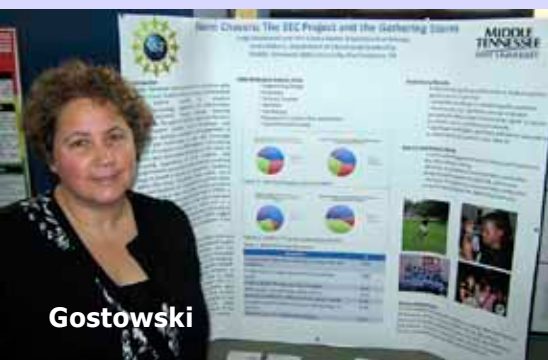
Prashant Singh, **Saffet Guleryuz**, **Michael Thompson** (faculty), and **Rebecca Seipelt** (faculty) presented "Cloning, Expression, and Purification of Human Matrix Metalloproteinase-14 (MMP-14)."

cont.



Head

Justin Head and Jerry Reagan (faculty) presented "Mechanism of Cell Death in Neuroblastoma Cells Exposed to UV-light."

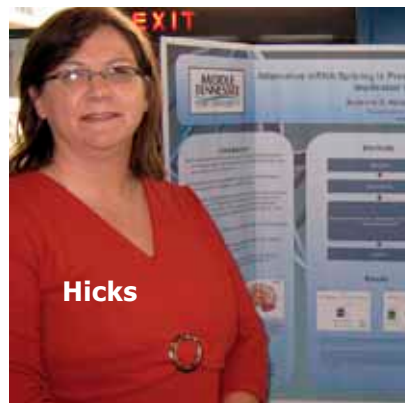


Gostowski

Leigh Gostowski, Kim Sadler (faculty) and **Linda Gilbert** (faculty, Educational Leadership) presented "Storm Chasers: The Energy, Earth, and Civilization Project and the Gathering Storm."

Undergraduate Student Presentations

Suzanne Hicks and Rebecca Seipelt (faculty) presented "Alternative mRNA Splicing is Prevalent in Genes and Regions of the Brain Implicated in Bipolar Disorder."



Hicks



Burrell

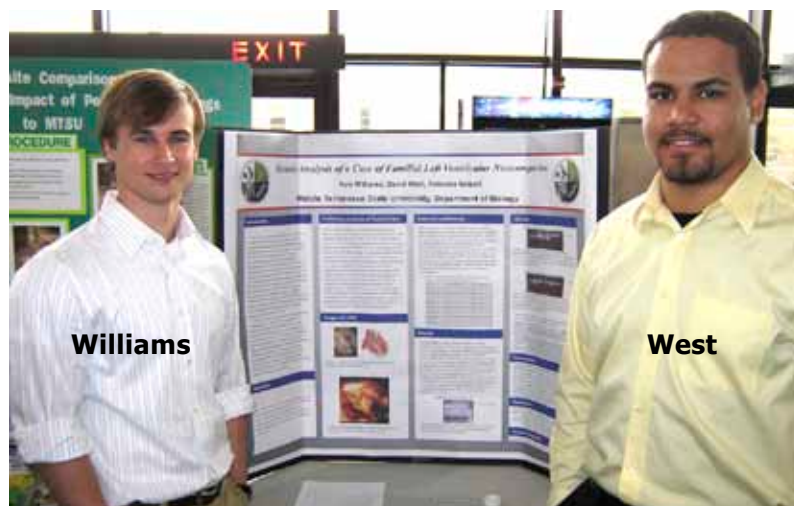
Eterial Burrell and John Zamora (faculty) presented "Isolation and Identification of Microbes that Degrade *Sevin-10* Insecticide Using Biometric Analysis."

Payal Gupta, Mohammed Mahmood, and John Zamora (faculty) presented "Anti-Microbial Properties of *Melaleuca* Oil."



Gupta

Kyle Williams, David West, and Rebecca Seipelt (faculty) presented "Genetic Analysis of a Case of Familial Left Ventricular Noncompaction."



Williams

West



Ladd

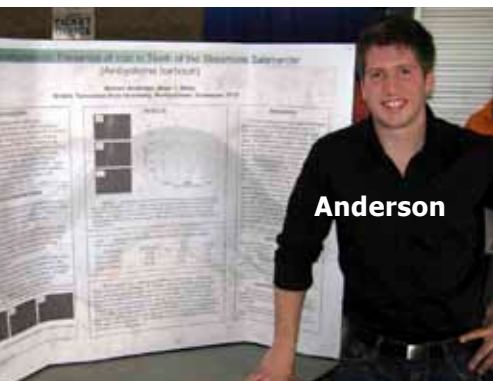


Dunn

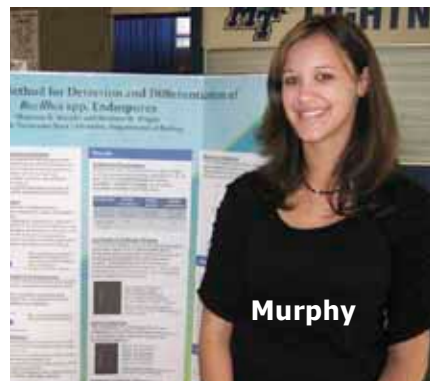
Ashley Ladd, Anthony Newsome (faculty), and **Mary Farone** (faculty) presented "Common Use Environments: a Concern for Community-Acquired Methicillin-Resistant *Staphylococcus Aureus* (MRSA)."

Sade Dunn and Bruce Cahoon (faculty) presented "Expression of Photosystem Genes in Bundle sheath and Mesophyll Cells in the *Zea mays* Leaf Tip."

Sade Dunn and Bruce Cahoon (faculty) presented "Synthetically Replicating Antigenic Regions in *Shigella flexneri* and Utilizing pBI121 as a Vector."



Anderson



Murphy

Michael Anderson and Brian Miller (faculty) presented "Developmental Presence of Iron in Teeth of the Streamside Salamander (*Ambystoma barbouri*)."

Shannon Murphy and Stephen Wright (faculty) presented "A Label-Free Method for Detection and Differentiation of *Bacillus sp.* Endospores."



Roche

Shannon Roche, Nicole Porter, and Jeffrey Leblond (faculty) presented "Sterol Biosynthesis in the Marine Dinoflagellate, *Karenia brevis*."

cont.

Merranda Holmes and Stephen Wright (faculty) presented "The Production, Quantification, and Fluorescent Detection of Anthrax-Simulating Endospores."



Holmes

Nicole Porter, Matthew Bruckert, Rebecca Johnson, and Mary Farone (faculty) presented "Cooling Towers as a Source of Novel Bacterial Pathogens."

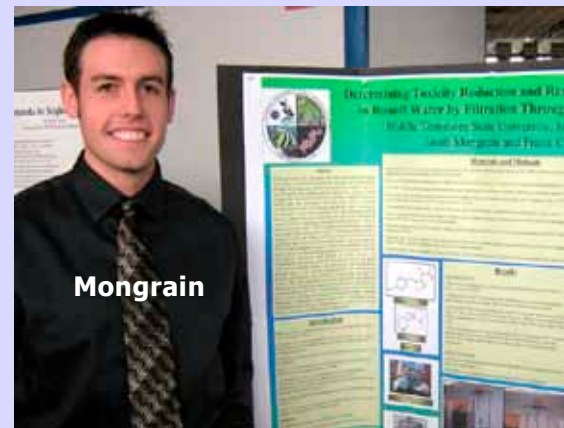


Porter

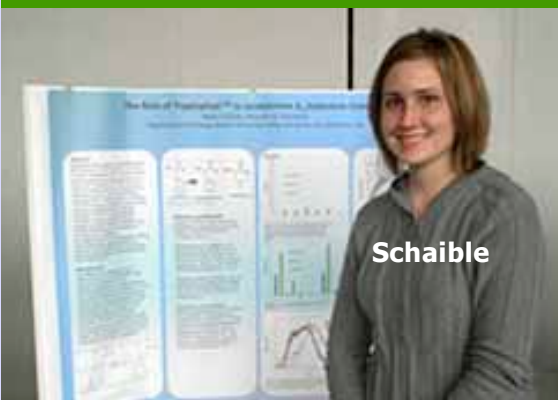
Bruckert

Carly Neilson, Hailey Burton, Lacy Danikas, and Vince Cobb (faculty) presented "Locomotor Performance of Recently-fed Watersnakes."

Jacob Mongrain and Frank Bailey (faculty) presented "Determining Toxicity Reduction of an Insecticide in Runoff Water Filtrated through Pervious Concrete."



Mongrain



Schaible

Alexis Schaible and **Michael Thompson** (faculty) presented "The Role of Tryptophan 356 in LTA4H Catalysis."

Nida Shirazi, Jack L Ratliff (community member), Yanchun Liu, Leslie Wisner-Lynch (community member), Gino Bradica (community member), and **Michael Thompson** (faculty) presented "Screening Scaffolds for Rotator Cuff Regeneration: Cellular Migration in Collagen Pads Is Enhanced by rhPDGF-BB and Inversely Related to Collagen Density."



Swift

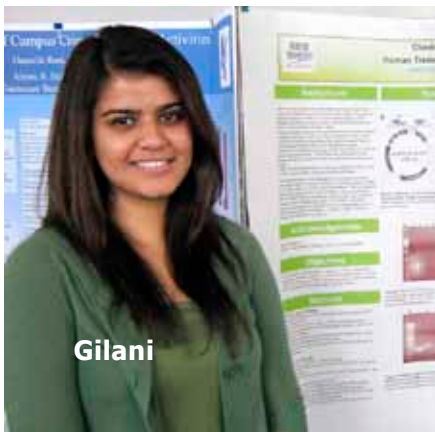
Crouse

Mary Crouse, **Evan Swift**, **Jerry Reagan** (faculty), and **Rebecca Seipelt** (faculty) presented "Mechanism of Reduced Sphingomyelinase Activity in Niemann-Pick Type C."

Brian Choate, **Michael Thompson** (faculty), and **Rebecca Seipelt** (faculty) presented "Investigating Chloride Activation of a Novel Human Aminopeptidase."

Asra Gilani, **Michael W. Thompson** (faculty), and **Rebecca Seipelt** (faculty) presented "Cloning, Expression, and Purification of Human Tissue Inhibitor of Metalloproteases-2 (TIMP-2)."

Leonela Carriedo and **Bruce Cahoon** (faculty) presented "Bridging the Switchgrass Genome."



Gilani



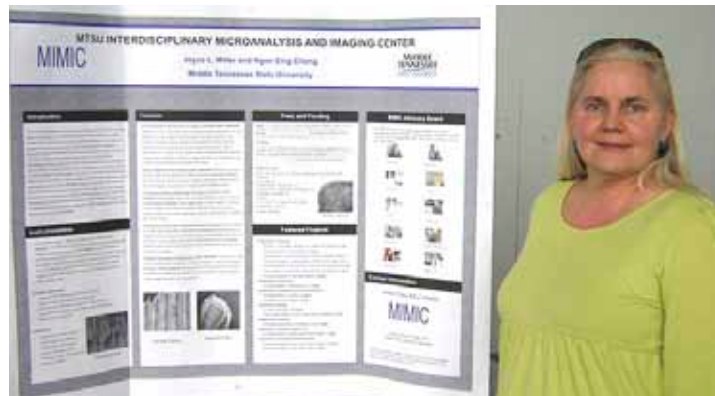
Carriedo

Center Presentations

Karen Metius-Howse (right) and **Kim Sadler** (faculty) presented "Center for Environmental Education and Cedar Glade Studies."



Joyce Miller presented "MTSU Interdisciplinary Microanalysis and Imaging Center."



External Funding Helps Maintain Research and Teaching Programs

With decreased state funding, outside sources of revenue have become more crucial to maintaining high levels of research and instruction. Securing those outside funds is not an easy task. However, several faculty members have been very successful at doing just that. Although the results of their efforts usually get identified in the Annual Report, we at *BioUpdate* thought it would be fitting to recognize them in this issue. Over the past year, \$5,170,097 of outside funding was secured by Biology Department faculty members.



DuBois, John.

LI-COR Environmental Education Fund (LEEF),
LI-COR
\$40,000, along with a \$50,000 matching grant from
the MTSU Foundation

In March 2009, DuBois was awarded a grant from LI-COR Biosciences toward the purchase of the LI-6400XT Portable Photosynthesis System. In addition, he received the necessary matching grant of \$50,000 from the MTSU Foundation. This state-of-the-art instrument clamps onto a leaf and is able to assess the CO₂ exchange activity, stomatal conductance, and other properties. There is no damage to the leaf and the investigator can control and manipulate leaf temperature, light intensity, humidity, CO₂ concentration, and other variables. The instrument was purchased for use in the Plant Physiology course and in student research. In June

2009, DuBois attended a week-long training session at LI-COR headquarters in Lincoln, Neb. While there, he received valuable hands-on training and was able to tour the manufacturing facility.

Farone, Anthony; Farone, Mary; Sadler, Kim; Myles, L.

National Science Foundation
Integrating **T**eaching, **R**esearch, and **I**ndustry
Applications to **D**eepen Scientific Understanding.
\$2,980,806

This five-year TRIAD GK-12 program will make an innovative, three-fold connection between graduate fellows (GF) from MTSU/TSU, partner teachers (PT) and their high school biology students in middle Tennessee, and regional biotechnology/biomedical industry partners (IP). The overall theme is "Applications of Cellular and Molecular Biology Research." TRIAD will provide GFs with opportunities to (1) improve communication skills through teaching and presentations as they share research and knowledge with PTs, students, other GFs, and industry leaders; (2) connect their research to applied technologies/products through the design and teaching of a biology unit; and (3) establish relationships with industry scientists. Each summer, GF-PT pairs will spend time in both the research laboratory of the GF and in the facilities of their selected IP.

Following this experience, the GF-PT pair will develop a standards-based teaching unit focusing on a research area related to the interest of GF and IP. GFs will also mentor high school biology students. Fellows will help students develop a hypothesis, conduct experiments, analyze data, draw conclusions, and write papers for presentation at the Tennessee Junior Academy of Science. Broader impacts of this project include the assimilation of industry connections and a K-12 experience into STEM graduate education; engaging entire classes of high school biology students from high-need schools in inquiry-driven, hands-on research; and facilitating partnerships with industry toward long-term, sustainable programs that will impact the education continuum (K-20+), resulting in better prepared science graduates from high school through graduate school.

cont.



Students involved in the TRIAD Project (from left): Sergei Ustinov (Chemistry), Jessica Ford, Abby Drumwright, and Lacy Danikas

Newsome, Anthony; Farone, Mary; and Farone, Anthony (with Chemistry and Agribusiness and Agriscience faculty members and Hugh Berryman, Sociology and Anthropology, as PI) \$300,000 over two years
"Aerobic Decomposition - Alternative Method for Managing Large-scale Animal Fatalities"
SERRI (Southeast Regional Research Initiative)

The general goal for this research is to provide a scientifically proven, acceptable, and cost efficient method for appropriate disposal of deceased animals in high-magnitude mass fatalities. A. Newsome will investigate microbial decontamination of carcasses, A. Farone will analyze runoff, and M. Farone will isolate pentobarbital degrading bacteria.

Leblond, Jeff.

Molecular and Cellular Biosciences – Biomolecular Systems Cluster, National Science Foundation Title: Sterol Biosynthesis in the Marine Dinoflagellate *Karenia brevis*.
Project Period: September 1, 2008 – August 31, 2010
\$156,000

The proposed work will examine sterol biosynthesis in *Karenia brevis*, a unicellular, eukaryotic alga of great environmental and economic importance. Preliminary data suggest a more plant-like pathway

for *K. brevis* rather than the yeast-like pathway that has been hypothesized to date in other dinoflagellates. The objective of this study is to elucidate important biochemical steps in the biosynthesis of brevestanol and gymnodinosterol, the primary sterols of *K. brevis*, by determining structures of selected intermediates that accumulate during exposure to particular fungicides. This work will be the first to elucidate specific biosynthetic steps in the production of *K. brevis* sterols. This is of particular importance because, despite the significant historical attention given to dinoflagellate sterols as environmental biomarkers for this class of algae, few have turned their attention to how these molecules are produced.

The proposed collaborative work represents a unique opportunity for undergraduate researchers. Undergraduate students will be trained and will actively participate in the laboratory studies at Middle Tennessee State University (MTSU), reflecting the Project Kaleidoscope (PKAL, www.pkal.org) teaching philosophy embraced by the Principal Investigator (PI). Students will be exposed to both lipid biochemistry techniques under the guidance of the PI. The chance for undergraduate students to participate in such a project will, it is hoped, train and excite them, thereby propelling them into strong Ph.D. programs at other institutions.

This training and motivation in basic scientific research is an important component of the proposed activities. The forecasted shortfalls in young scientists in the United States is of concern to all, and including students in basic research at earlier points in their careers has been recommended as a means of encouraging more students, particularly those from minority and underrepresented groups, to pursue science careers (Committee on Science, 2006). MTSU is well situated to serve this purpose. It is the second largest university in Tennessee (with the largest undergraduate enrollment), and is in prime position to recruit many strong young scientists. The goal is to produce valuable information on a very economically and environmentally important marine alga while at the same time enticing students into this exciting area of biochemistry.

cont.

Anthony Newsome (and others).
Southeastern Center for Emerging Biologic Threats.
Occurrence and Distribution of *Trypanosoma cruzi* in
Tennessee. \$50,000

In conjunction with other investigators, Charles McGhee and Newsome reported the presence of a kissing bug infected with the parasite *Trypanosoma cruzi* (typically found south of the United States border) in 2000. It was also established that a resident in Rutherford County had become infected as a result of an insect bite. In 2006, McGhee and Newsome also reported the occurrence of infected insects in Davidson and Cannon counties. Subsequently, members of the Tennessee Department of Health, in conjunction with MTSU faculty, applied to the Southeastern Center for Emerging Biologic Threats for funding to study the occurrence and distribution of *Trypanosoma cruzi* in Tennessee. The goal of this grant is to better understand the transmission dynamics and risk of *T. cruzi* infection to humans and animals. Funds have supported an MTSU graduate student study. Funds also support the use of molecular biology techniques to identify insects and animals in Tennessee that may harbor

the parasite.

In conjunction with other MTSU faculty members, funding is being received from the Southeast Region Research Initiative to support a project titled "Aerobic Decomposition-Alternative Method for Managing Large-Scale Animal Fatalities." The goal is to provide a scientifically proven, acceptable, and cost-efficient method for the appropriate disposal of deceased animals in high-magnitude mass fatalities.

In the last six years, Newsome and some of his students have investigated the potential of chlorine dioxide to kill disease-causing organisms. This work has been directed primarily at microorganisms in drinking water and nonliving objects such as carpet, wood, etc. In this newly funded project, Newsome will investigate the ability of chlorine dioxide to kill microorganisms associated with animal tissue. This may promote a method to eradicate disease-causing microorganisms on the surface of animal tissues before the animals are disposed of.

The Center for Environmental Education

The CEE currently has several projects for which it is receiving external funding. You can read about those elsewhere in this issue. ●



Logo Shirts and More!

Shirts, coffee mugs, and water bottles sporting the department logo are available for purchase. 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. Faculty and students have been seen proudly wearing the shirts! The coffee mugs are white with the logo in blue on both sides. The stadium cups are 16 oz. blue plastic with a white logo. Key lanyards of blue ribbed polyester cord with white letters spelling MTSU Biology are also available.

T-shirts Short-sleeve: \$10
Long-sleeve: \$12

Polo shirts Short-sleeve: \$20
Long-sleeve: \$25

Denim shirts Long-sleeve: \$28

Heather gray pull-over **hoodie** \$25
(Printed like t-shirts)

Coffee Mugs \$3

Stadium Cups \$1

Key Lanyards \$2

All items can be purchased in the Biology Department office. For more information or to purchase an item (or two), contact **Virginia McKnight** (615/898-2291 or email mcknight@mtsu.edu).



Department Thesis Count Exceeds 300

There have now been more than 300 biology theses completed at Middle Tennessee State University. As of the December 2009 Commencement, there were 311 theses completed. We thought it was time for another update on the thesis collection. There have been two previous articles in *BioUpdate* characterizing the collection. In the Spring 1988 issue, Clay Chandler presented the total number of theses by year along with page counts and theses arranged by broad topic areas. At that time (through 1987) there had been 122 theses completed, the shortest being 13 pages and the longest 143 pages.

In the Spring 1999 issue, Shuhanna Carter (student worker) and John DuBois presented a continuation of Chandler's compilations. By the end of 1998, 180 theses had been completed. The shortest was still 13 pages; the longest was 263 pages (which remains the longest). In December 2009, the department graduated its 311th thesis student. That represents an average of about seven theses per year over the 42 years of the M.S. program in Biology. However, from 2000 until December 2009, there were 117 theses completed, an average of 11.7 per year. That decade represents, by far, the most productive with respect to completed theses. **Figure 2** on the next page displays the growth of the departmental thesis collection since 1967.

Interestingly, of the 311 theses, 160 were laboratory studies and 151 were primarily field studies. Those field studies were conducted in 38 counties throughout Tennessee (**Figure 1**). In addition, two field studies were conducted in Missouri and Alabama and one in each in Maine, Florida, Georgia, and Louisiana. One additional field study was conducted in the Carribean.

When assessing the groups of organisms studied by students, it is not surprising that bacteria, angiosperms, and mammals have been the most studied (**Table 1**). However, a wide diversity of organisms, ranging from viruses to vertebrates, has been studied by our students over the years and represents the expertise and interests of a diverse faculty.

A few final numbers. There have been 47 major professors for the 311 theses. Additionally, these theses contain a total of 18,120 pages, or an average of 58 pages per thesis. A complete set of theses is housed in the Biology Department office and in the University thesis collection in Walker Library. A list of all theses completed in biology can be found at www.mtsu.edu/~jddubois/3230/theses.html.

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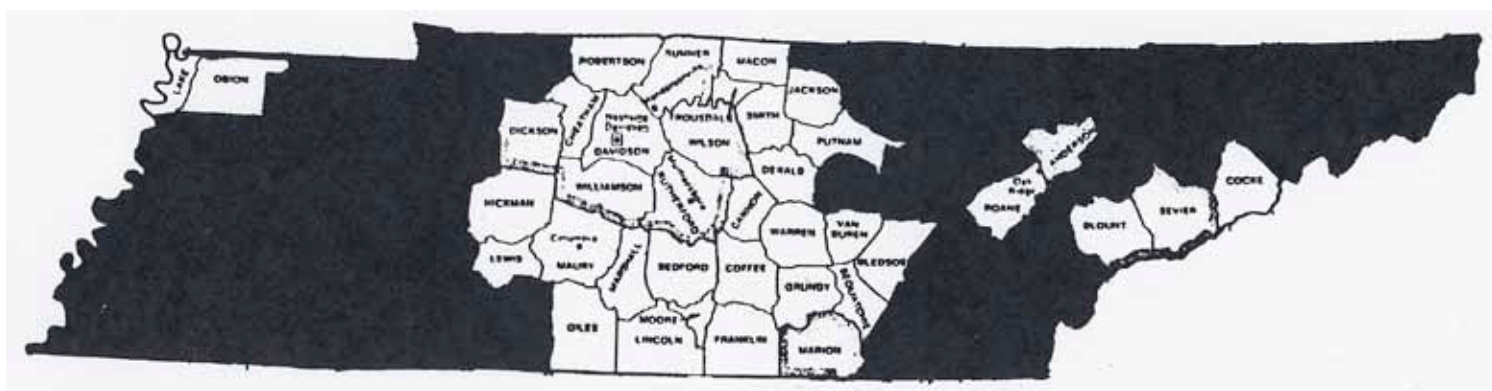


Figure 1
Tennessee counties represented in Biology theses that involved field studies

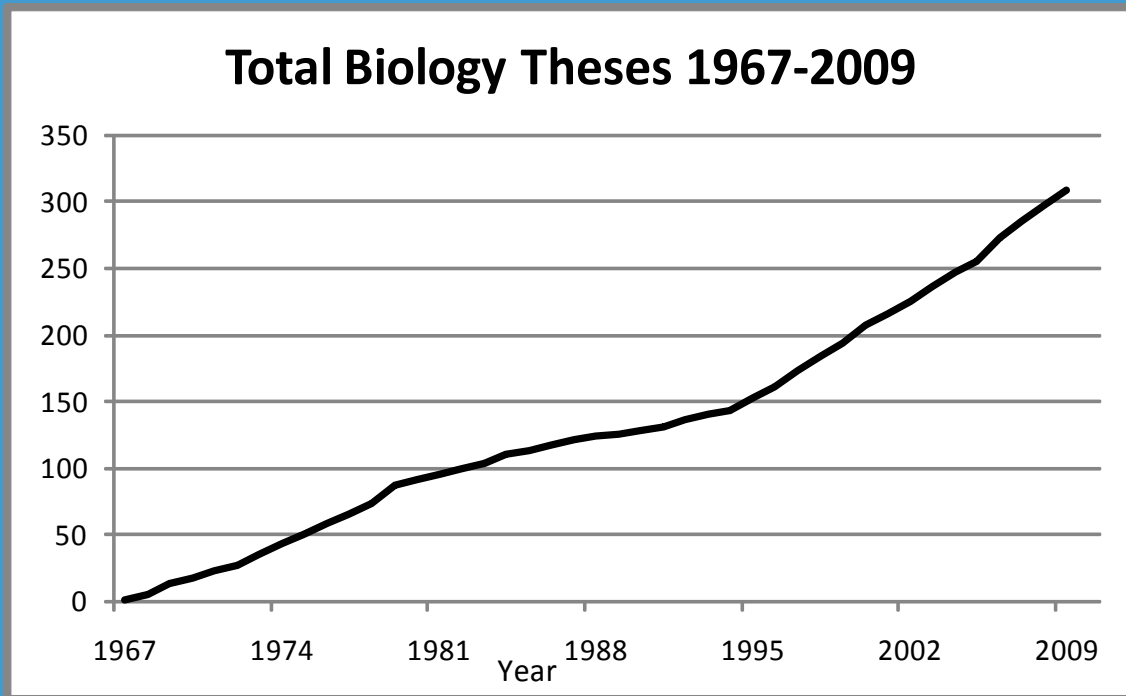


Figure 2: Total number of theses completed in biology at MTSU from 1967 to 2009.

Table 1. Groups of organisms studied in master's theses. (Some theses are assigned to more than one group.) Current through December 2009.

Organism	Number	Organism	Number
Viruses	14	Cnidarians	1
Bacteria	65	Gastrotrichs	1
Fungi	6	Snails	1
Lichens	1	Crustaceans	7
Slime Molds	1	Insects	11
Algae	10	Arachnids	6
Mosses	1	Macroinverts	10
Ferns	1	Fishes	19
Gymnosperms	1	Amphibians	21
Angiosperms	44	Reptiles	24
Protozoans	17	Birds	20
Flatworms	14	Mammals	50
Roundworms	6	Vertebrates	1
Tardigrades	2	(various)	

In Memoriam: Dr. Clay Chandler

Clay Chandler, Professor Emeritus, passed away November 17, 2009, at the age of 82.

Clay Chandler was born in McKenzie, Tenn. He attended public schools there and at nearby Martin and Milan. Following graduation from Milan High School, he entered Clemson College but soon dropped out to join the U.S. Army. He served in Japan with the Army of Occupation. In 1947, he enrolled at Bethel College and completed a bachelor's degree in chemistry. After a second tour in the military, he was employed as a teacher at Lavinia, Tenn., and later at his alma mater, Milan High School. He continued his education during the summers at Peabody College, where he earned an M.A. in 1955.

In 1959, he became an assistant professor of biology at West Georgia College. Two years later he entered Indiana University, where he spent four years under the direction of Dr. David Frey, a noted limnologist. At Indiana, he brushed shoulders with a number of renowned biologists, including Tracy Sonneborn, Marcus Rhoades, and Nobel Laureate H.J. Muller. During one summer he occupied Muller's office and had access to his personal library! Chandler received his Ph.D. from Indiana in 1965 and returned to Bethel College, where he was professor and chair of the Division of Science and Mathematics. In 1970, he came to MTSU as professor of biology. He developed a two-course sequence for the Honors Program. His courses in ecology, limnology, micro-technique, and biological literature enjoyed longstanding reputations for rigor and thoroughness. His lectures were filled with poetry, witticisms, and anecdotes. He seemed to always have a boyish enthusiasm for science, especially when it related to his specialty, planarians.

Chandler sustained a record of productive research spanning four decades. He and coworker Julian Darlington conducted several statewide faunistic surveys of freshwater planarians. His research was published in many regional, national, and international journals, including *The American Midland Naturalist*, *The Journal of Freshwater Ecology*, and *The Bulletin of Environmental Contamination and Toxicology*. In 1987, Chandler received the MTSU Foundation Award for Outstanding Research for his work on the systematics of planarians and for focusing new attention on a relatively obscure invertebrate group known as horsehair worms (*Gordiaceae*). After publishing papers on horsehair worms with his good friend and colleague, Marion Wells, Chandler joked that there would be enormous interest in that research and once the word got out, they would need to call campus police in for crowd control!



His expertise was valued and often sought by colleagues, museums, and private businesses. At MTSU, he mentored 13 graduate student thesis projects along with numerous undergraduate studies. He was a member and fellow of the Tennessee Academy of Science, the Association of Southeastern Biologists, Sigma Xi, and the American Association for the Advancement of Science. He served as president of the Tennessee Academy of Science and the local chapter of Sigma Xi. In 1987, a scholarship was established in his name to honor his distinguished service to the department and the University. The Clay M. Chandler Outstanding Freshman Biology Award and Scholarship is awarded annually to an outstanding student in general biology classes.

Following retirement in 1992, Chandler returned to his hometown of Milan, where he volunteered at the Mustard Seed and Wesley Fountain Place regularly until his illness. He was a member of the Milan First United Methodist Church, taught Sunday School, and helped in the office. He was a member of the Friends of the Milan Library where he often gave book reviews. He could be seen almost every day walking his dog, Cosmo, along the streets downtown.

Chandler was married to the late Jimmie Cary Chandler. He is survived by two sons and daughters-in-law: Morris and Cyndy Chandler of Milan, and David and Carrie Chandler of Park Hills, Ky.

Clay Chandler was an outstanding scholar, teacher, southern gentleman, and friend to many faculty members and students. The Biology Department is better today as a result of his many contributions. ●

What's Up at the Center for Environmental Education?

by Cynthia Allen and Cindi Smith-Walters

Of noteworthy interest is our newly developed, online Four Season Virtual Tree Trail. Funded in large part by the MTSU Foundation, it was developed as a virtual trip from a real path at the Murfreesboro Barfield Crescent Wilderness Station Park. Visitors experience year-round sights and sounds of a walking trail environment and learn more about it through: identification of tree species at various stations using features such as leaves, twigs, bark, flowers, and fruits; natural history including ecological, cultural, and economic importance of various species; wildlife habitat including the vocalizations of various birds, etc. The incredible photos and recordings are the work of CEE part-time staff member and TAMP (Tennessee Amphibian Monitoring Program) director, Bob English. Be sure to check out this interesting and educational site. This is an especially valuable resource during a time when formal and non-formal educators are not able to conduct field trips, and for the general public who want to get a feel for the outdoors and better understand what they are experiencing. In addition, it is truly educational for handicapped or homebound individuals.



The trail is a good example of the efforts and mission of the center. As a branch of the MTSU Biology Department, the CEE is dedicated to improving environmental education by raising awareness, imparting knowledge, teaching skills, and inspiring a commitment for the environment so citizens become equipped to make responsible decisions that conserve and sustain our unique heritage and resources.

There are a number of unique outreach programs and opportunities housed under the CEE umbrella. Visit www.mtsu/mtsu.cee to get more details. In the meantime, a brief description of the past years' efforts, grants, available resources, staff activities and happenings follow.

CEE Grants/Projects

The center is funded entirely by soft money (grants and contracts). Our recent grant awards include

- \$120,000 from the Tennessee Stormwater Association (TNSA) for the Water-Works! program (www.TennesseeWaterWorks.com) to continue providing internal support services to stormwater managers across the state who are part

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of the Municipal Separate Storm Sewer System (MS4) TNSA membership. In addition, WaterWorks! will also provide external educational resources to continue a unified, statewide campaign for water quality protection. Education services include the development of resource materials, outreach services, and public service campaigns and development of a clearinghouse for valuable stormwater resources that will be housed at www.tnstormwater.org. This grant includes a partnership/match from the Tennessee Department of Transportation/TDOT and the Tennessee Department of Environment and Conservation/TDEC.



- \$121,145 from the Tennessee Department of Agriculture (including matching funds) for the development and production of a 24-page activity booklet, *Discover the Waters of Tennessee*. The booklet is a partnership with National Project WET and will highlight the unique watersheds and resources of Tennessee including environmental and regional influences. As part of the award-winning, copyrighted *Kids in Discovery* booklet series developed by Project WET, this booklet will focus on youth and informal public education audiences and will be distributed statewide.

- \$40,000 Faculty Research and Creative Activity Committee Synergy Grant titled "Social Factors in Changing Water Use in a Rapidly Urbanizing Watershed" wherein citizen perception and understanding of water quality issues within Rutherford County and the Stones River Watershed are being examined. This grant is in cooperation with the MTSU Sociology and Anthropology Department's Angela Mertig.

- \$40,000 Amphibian Research Grant from the Tennessee Wildlife Resources Agency/TWRA allowing

continued research to assess the abundance of breeding populations of frogs and toads statewide for the Tennessee Amphibian Monitoring Program/TAMP. The research data provide a better understanding of the distribution and relative abundance of each species and can be used to establish a baseline reference as well as to help reflect growth and development of local amphibian populations.

- \$1,500 MTSU Public Service Grant for "Oh ME! Oh MY! Mitosis and Meiosis Explained," a workshop attended by over 100 participants at the National Science Teachers Association National Conference in New Orleans.

- \$39,678 TDEC Grant in partnership with the Discovery Center titled "Hands On Activities to Promote Watershed and Wetlands Education." This project engages school children in monitoring and reporting on the wetlands surrounding the Discovery Center and informs them about related environmental issues. Youngsters prepare video broadcasts from the "field" (i.e., from locations on the Murfree Spring grounds), from other parts of the Stones River Watershed, and/or from a studio installation inside the Discovery Center. The broadcasts are used to produce audio podcasts and video clips that can be distributed to local government cable channels 3 (Smyrna and Murfreesboro) and 19 (Rutherford County) and broadcast at local schools. Resources are available at the Discovery Center location as well as on the Web site, www.discoverycenteronline.org/.

This past summer, the CEE completed a multi-year, \$1,143,161 grant from the Tennessee Department of Environment and Conservation (TDEC) Used Oil Program. The final project included conducting a survey of 3500+ Tennesseans for their views on the environment and recycling used motor oil. The survey is helping the TDEC determine how to better educate its target audience, specifically Tennessee's DIYers (Do-It-Yourselfers). The grant also funded the development of multiple television and radio public service announcements that are in use statewide as part of a water quality campaign. Many of these can be found on the Environmental Protection Agency/EPA Web site in the "water resource toolbox." These resources continue to be used by stormwater managers, watershed groups, and others across the state in public education campaigns for water protection.

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Current partnerships with TDEC and TDOT include development of a state map with watershed information to be distributed at rest stops and welcome centers. A youth watershed activity travel booklet has been drafted as a possible future companion piece.

Recent CEE Awards

An award was received for the *WaterWorks! DVD, The Empower Hour*, developed for the TDEC Used Oil Program. The focus of the video was to educate new and teen drivers about ways they can make a difference and reduce water pollution through better vehicle maintenance. Selected from over 13,000 entries, this video and its producers won the coveted Silver Telly Award.

The Award of Excellence for Educational Programming from the Tennessee Association of Museums was for the CEE's work with the Tennessee State Museum on a series of public programs, teacher workshops, and a newspaper insert which accompanied the museum's exhibition, *The River Inside: John Guider's Amazing Journey*. The newspaper insert was a 12-16 page foldout with activities and information for teachers and students appropriate for grades 3-7. There was a minimum circulation of 30,000+ across Tennessee including Newspaper in Education partners and content featured watersheds, water quality, water usage awareness, historic river information, and economic/business/industrial uses of rivers. Each segment included information and activities tied to state curriculum standards for science, math, language arts, and social studies that will raise awareness of the importance of water, watersheds, and waterways in our everyday lives.

Kim Sadler (recipient) and **Cindi Smith-Walters** (honorable mention) were recognized for the College of Basic and Applied Sciences Excellence in Grantsmanship \$1M Dollar Club award. Smith-Walters also was Tennessee Project Learning Tree Facilitator of the Year for 2009.

CEE Staff

Cindi Smith-Walters is serving on the State Task Force for the Tennessee Master Naturalist Certification Program, the Keep Tennessee Beautiful Committee (by

appointment of the Governor), and the Association for Science Teacher Education Professional Development Committee. She was also named to a three-year term on the Children's Book Council for the National Science Teachers Association. This past year, she personally reviewed more than 300 children's science trade books for scientific accuracy. After reviewing, she distributed the books to a number of classroom teachers in Cannon, Wilson, Rutherford, and Williamson counties, and to the MTSU Early Childhood Development Center, non-formal educators at Children's Discovery Center, and even a Topics in Environmental Education class for middle grade math and science preservice teachers to get feedback for the CBC Committee. Many of the books will be put in resource totes for loan through the Center, while others will be donated for community use. Other recent activities included working with a State Department of Education group to correlate activities for the well-known environmental teacher guides for Project WILD, Project WET, and Project Learning Tree to the new state standards in language arts, social studies, mathematics, and science.

In April, Smith-Walters was asked by the director of Tennessee State Parks to conduct two personnel workshops on grant writing and securing funding for projects to be implemented on state property. The workshops were held at Henry Horton State Park and attended by park rangers and naturalists from across the state. In May, Smith-Walters was the invited keynote speaker for the second annual Tennessee Outdoor Classroom Symposium. Co-sponsored by the Tennessee State Department of Education and the Tennessee Environmental Education Association, the event was held at Montgomery Bell State Park and had over 400 attendees. Her keynote address and several workshops at the symposium were recorded and segments were broadcast on *Tennessee Wildside*. At the symposium, Smith-Walters also conducted a half-day workshop with former center staffer Karen Hargrove, a current MTSU doctoral student in Health and Human Performance.

Cindi Smith-Walters, Padgett Kelly, and Cynthia Allen conducted workshops at the 2009 Tennessee Environmental Educator Association/TEEA annual conference. In keeping with the water quality mission of the Center for Environmental Education, Smith-Walters and Allen are serving on the Tennessee Watershed Conference Steering Committee for plan-

ning and coordination related to the upcoming 2010 Watershed Summit. In addition, Allen was nominated and now serves as a board member for the Stones River Watershed Association.

Bob English continues to coordinate activities for TAMP. The program, funded by the Tennessee Wildlife Resources Agency, is growing and today there are nearly 100 active "frogloggers" reporting. **Amanda Sherlin** has been promoted to CEE grants coordinator and has played an integral role as she represents the center and works with campus groups seeking additional funding and collaborating on projects.

Padgett Kelly is still conducting educational outreach programs at community schools with his life-size replica of a humpback whale. Kelly also is conference co-chair for the 2010 National Marine Education Association/NMEA. He presented at the 2009 NMEA Conference in Monterey, Calif., and the Tennessee Science Teacher Association/TSTA meeting.

Kim Sadler's presentation was accepted for the August 2009 meeting of the Ecological Society of America for the Noxious Neighbors/Invasive Plant Curriculum Guide developed in partnership with the Tennessee State Parks. She also conducted a poster presentation about cedar glades at the National Association of Biology Teachers/NABT.

Resources of Interest

Many resources and materials are available year round to educational groups in middle Tennessee. Some of these include

Microscope and Resource

Trunk Loan programs. Recycled compound light microscopes, dissecting microscopes, micro-viewers, hand magnifiers, and related traveling trunks are loaded with teaching materials (curricula, videos, books, and resources to use for a unit).



WaterWorks! Education to improve water quality in Tennessee through public service announcements, StreamSavers/youth stewardship certification program, stormwater protection brochures, surveys, a

Web site which includes an interactive watershed map of the state, and related activities. The above resources are available for non-profit use.

Professional training. Includes after-school workshops and in-services for educators. Opportunities range from field trips to workshops and seminars geared toward increasing content or technology knowledge of teachers, youth leaders, administrators, home schoolers, and the general public. Some examples of specific training using internationally recognized curricula include workshops for GLOBE (Global Learning and Observations to Benefit the Environment), Project WILD (Wildlife in Learning Design), WILD Aquatic and Flying WILD, Project Learning Tree, Project WET (Water Education for Teachers), Population Connection, and Facing the Future.



Center for Cedar Glade Studies. The CCGS was formally established in 2005 to provide information and education about this unique habitat to scientists and the public.

Distance Learning Programs. Center programs with a studio audience are broadcast to outlying rural counties, local school channels, and out of state via a satellite system at MTSU.

Vocalizations of Frogs and Toads of Tennessee CD. Features the distinct recordings of various calls from amphibian species across the state.

Don't forget, the new online **Four-Season Virtual Tree Trail** can be found at the Center's Web site: www.mtsu.edu/~mtsucee.

We're excited about the upcoming year and the many new projects gearing up. If you want information on the CEE, any of our programs, or available environmental resources and literature, feel free to contact us at 615/898-2660. ●

BioUpdate 1987: A Look Back

BioUpdate has been in existence for 23 years. The first issue was printed in Spring 1987. In that first issue, Department Chair George Murphy stated that the two main objectives were (1) to inform our alumni and current students of events taking place within the department and University; and (2) to make known the accomplishments of past and current students. Although there have been some format changes in the newsletter and its size has grown considerably (the first issue was eight pages), the objectives and focus have not changed!

As a new segment, each year we will be looking back at previous issues to recount activities of the department, faculty, and former students. We hope you enjoy this short trip down memory lane.

In 1986, the biology department sadly lost Mary C. Dunn. In 1987, the scholarship bearing her name was established. Gerald Parchment, former faculty member (1949-1989) was honored as a Distinguished Alumnus of Middle Tennessee State College. Delbert Meyer, professor and former Vice-President for Academic Affairs, resigned his teaching position to head Ohio University's Chillicothe campus in January 1987. William Butler joined the faculty to replace Meyer for the remainder of that year. Kurt Blum and Thomas Hemmerly were field leaders at the tenth annual Wildflower Pilgrimage held at Cedars of Lebanon State Park. The wildflower pilgrimage is now part of the Elsie Quarterman Glade Festival. This year the festival will be held April 30-May 1, 2010.

The Biology Club reported its recycling program was going well. As of August 1986, more than three million pounds of paper had been recycled. Funds from that program were used to fund scholarships for biology students. That year, nine scholarships of approximately \$500 each were being awarded annually. In October of 1986, the Biology Club expanded its recycling efforts to include aluminum cans. Today there are 32 scholarships that each award \$500 annually to biology students.

In summer 1985, a mega-DNA was discovered on campus! This DNA reappeared in the summer of 1986, suggesting that it might be capable of replicating! The double helix was a cleverly designed flowerbed located on the east side of Davis Science Building directly in front of the tile mural. ●



Featured Faculty Member: Brian Miller

Brian was born in St. Louis, Missouri, and grew up in Florissant, just north of St. Louis. As a boy, he and his two brothers would spend countless hours exploring creeks, fields, and woods, capturing prairie kingsnakes,



blue racers, northern watersnakes, eastern spiny softshelled turtles, and painted turtles. The young biologists would often bring home snakes, egg masses, tadpoles, and salamanders. These collections were used to study the development and metamorphosis of the amphibians and reptiles of the immediate area. The entire family would watch in amazement as the transformations occurred. His childhood passion for nature and wildlife prompted Brian to become a career biologist. He received his bachelor's degree in fisheries and wildlife from the University of Missouri in 1980. In 1983, he received his M.A. in biological sciences from

the University of Missouri. His Ph.D. in zoology was granted in 1989 from Washington State University in Pullman. His dissertation was titled "Comparative Analysis of the Prey Capture Mechanism in Salamanders and Newts (*Amphibia: Urodela: Salamandridae*) with Special Emphasis on Performance, Kinematics, and Dentition." Following graduate school, Brian began his career at Middle Tennessee State University.

In addition to teaching introductory biology courses (BIOL 1030, 1110, 1120), Brian has taught ornithology, herpetology, embryology, anatomy and physiology, scanning electron microscopy, transmission electron microscopy, energy dispersive X-ray analysis, and the courses for which he is best known, Vertebrate Zoology and Comparative Anatomy of the Vertebrates. As an instructor, he has been praised by his department chair, colleagues, and students. He is a past recipient of the College of Basic and Applied Sciences Excellence in Teaching Award and has been a finalist for the MTSU Outstanding Teacher Award.

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Although every member of the biology faculty has published research papers, few can boast that they have coauthored papers with every member of their immediate family. Brian Miller can!

PLETHODON DORSALIS (Northern Zigzag Salamander). **MAXIMUM SIZE.** Although Smith (1961, *The Amphibians and Reptiles of Illinois*, Bull. Illinois Nat. Hist. Survey 28:1-298) reported 114 mm TL for the largest *Plethodon dorsalis* collected in Illinois, Conant and Collins (1998, *A Field Guide to Reptiles and Amphibians of Eastern and Central North America*, 3rd ed., Expanded, Houghton Mifflin Co. Boston, Massachusetts, 616 pp.) reported maximum body size for this species as 111 mm TL. On 10 March 2006 we captured an adult female *P. dorsalis* beneath a decaying board at a field/forest edge in Cooper Hollow, Cannon County, Tennessee, USA that surpassed the previous record length. The specimen, deposited in the Middle Tennessee State University collection (MTSU 342C) had a TL of 120.1 mm and a SVL of 56.0 mm when relaxed prior to fixation. After preservation in 10% buffered formalin for 11 days TL was 118.6 mm and SVL was 55.2 mm.

Submitted by **JOSHUA A. MILLER** and **JACOB H. MILLER**, Saint Rose of Lima School, and **JOYCE L. MILLER** and **BRIAN T. MILLER**, Department of Biology, Middle Tennessee State University, Murfreesboro, Tennessee 37132, USA (e-mail: bmill@mtsu.edu).

Miller et al.

In research, Brian has been one of the Biology Department's most productive members. He has published almost 30 research articles, nine natural history notes, 35 geographical distribution notes, 12 government and agency reports, and other interest articles and species catalog accounts. His stellar publication record has been acknowledged twice by the College of Basic and Applied Sciences (in 2006 and again in 2008). He has coauthored 51 scientific presentations at venues ranging from the

Tennessee Academy of Science to the International Congress of Speleology. He was recognized for his outstanding presentation record with the College of Basic and Applied Sciences Excellence in Presentations Award in 2005. Nearly all of his 19 graduate students, along with several undergraduate students, have coauthored presentations and/or publications. Furthermore, research projects developed for his upper-level and graduate-level courses have resulted in publication with students from other research labs. Many of Brian's recent publications were coauthored with one of his former graduate students, Matthew Niemiller, a Ph.D. candidate in the Department of Ecology and Evolutionary Biology at the



Streamside Salamander

University of Tennessee-Knoxville. His research deals with the systematics, phylogeography, and population genetics of salamanders and cave-fish. Brian and Matthew have tracked many salamanders in Tennessee, often with mixed results and unintentional consequences. Matthew recalls some of the interesting experiences he and Brian have shared and some of the interesting people they met during their studies of cave organisms over the years. Brian was attacked by a dog in Grundy County while seeking permission from a landowner to access a cave. While leading a trip to a cave, Matthew was almost shot by a drugged landowner's son who had just gotten out of jail. However, not all their encounters have been negative. They've also met some of the kindest and most genuine people in Tennessee. Some landowners have driven them across their property to the entrance of caves (VIP treatment for cave biologists!) and have asked them to stay for dinner on a couple of occasions.

In the publishing arena, Brian has been able to do something that very few other faculty have, regardless of their discipline—publish with every member of his immediate family. In 2006, the Miller family (Brian, wife Joyce, and sons Joshua and Jacob) published the note "Geographic Distribution: *Ambysoma maculatum*" in *Herpetological Review*. The family collaborated again in 2007 on the natural history note, "*Plethodon dorsalis* (Northern Zigzag Salamander). Maximum Size" in *Herpetological Review*. The authorship on these notes is not easy to forget—Miller, Miller, Miller, and Miller! There have been several other notes and papers with

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various combinations of the Miller family authors. But this is not his only great accomplishment. Brian has the distinction of having a species named for him. Miller's Cave Beetle from Short Mountain, Cannon County, Tenn., is on the Tennessee Department of Environment and Conservation's List of Rare Animals. In Brian's own words, he is honored to have a "declining, blind, dung-grubbing, spineless animal" bear his name!

Research often requires funding, especially when considerable travel is involved. Brian has been very successful in attaining grant and contract funds to pursue his research program. He has received grants from the Tennessee Wildlife Resources Agency, U.S. National Parks Service, The Nature Conservancy, The U.S. Forest Service, and the MTSU Faculty Research Committee. This funding has supported studies looking at the Streamside Salamander, Tennessee Cave Salamanders, and the Northern Pike Snake, and has helped with identify and catalog the amphibians and reptiles of Stones River National Battlefield, the Milan Army Ammunition Plant, the Volunteer Ordnance Works, and Arnold Air Force Base.

Amphibians are not only his research interest but his hobby. On weekends, when other faculty members may be found enjoying non-academic activities, Brian will be outdoors hunting for herps and birds or maybe scouting a new cave. Often he is not alone, as his family also enjoys these activities. Along with his teaching and rigorous research program, Brian gives back to his field by serving in various capacities. Since 2000, he has been a section editor for *Caudata Accounts*, a *Catalogue of American Amphibians and Reptiles*, and since 2006 an associate editor for *Herpetological Conservation and Biology*. In addition, Brian has served on many boards whose tasks were focused on the effective management of various natural areas.

Brian has compiled a list of remarkable accomplishments while establishing an enviable career at Middle Tennessee State University. He has helped shape the lives of countless students, forming partnerships and friendships that will last for many years. If he were to retire today, he would leave behind a record that few will be able to eclipse. However, with his energy and enthusiasm for biology, herps, and caving, it doesn't look like he'll be winding down soon. ●



Spotted Salamander

ALUMNI making their mark

Hilda Azabache Orrillo (B.S. '07) and her husband had a baby in 2008.

Vickie (Douglas) Peterson (B.S. '87) has been a contract federal investigator with the U.S.I.S. since October of 1999.

Jennifer Freimund (M.S. '07) is in the physician's assistant program at Roanoke College in Roanoke, Va.

Heather Hensley (B.S. '05; M.S. '09) is a research technician at Biomimetic Therapeutics, Inc.

Capri Pace (B.S. '06) is married and is the mother of a baby boy.

Blake Peterson (B.S. '80) is an optometrist in private practice and currently serves as president of the Tennessee Academy of Optometry. He, wife Pamela, and their children, Nicolas and Kate, live in Cleveland, Tenn.

Julie Phillips (M.S. '06) continues work on her Ph.D. in computational biology at the University of California, Merced. Her project focuses on looking at aging and stress in relationship to a number of factors including translational accuracy and codon usage bias.

Danielle Richardson (B.S. '02; M.S. '06) is working at Vanderbilt University Medical Center, Center for Human Genetics Research, in the DNA Resources Core as a research assistant III. Her primary responsibility is extracting DNA from fresh whole blood, frozen blood, mouthwash, saliva, and brushes. Her work allows her to deal with the DNA Databank project (Bio VU) and the AIDS Clinical Trial Group (ACTG) at Vanderbilt.

Colleen Roden (M.S. '09) is a research technician at Biomimetic Therapeutics, Inc.

Kyle Sykes (M.S. '08) is teaching environmental science at Independence High School in Thompson's Station. He also coordinates the school's recycling program and is an assistant football coach for the freshmen team. Kyle continues working on fulfilling the requirements for his teaching license and should be finished this summer. Kyle got married on November 8, 2008, to MTSU alumnae **Sarah (Way) Sykes** (B.S. '03). She is a case manager II for the Tennessee Department of Children's Services. They live in Murfreesboro with their cat, turtle, two fish, and guinea pig. ●

from the lab of...

Andy Brower

Most researchers don't think of butterflies as poorly known, but their status as model organisms is not underlain by a firm understanding of patterns of diversity or relationship across all taxa.

The *Satyrinae* is a cosmopolitan, highly diverse subfamily of the butterfly family *Nymphalidae* that represents one of the most significant frontiers of persistent ignorance in butterfly taxonomy. Within this subfamily, the Pronophilina is one of the most morphologically diverse and species-rich satyrine groups, with its diversity (as currently circumscribed) extending from Central America and the Greater Antilles to Patagonia. Many species are narrowly endemic and exhibit geographical replacement over relatively short distances, making them ideal organisms for examining biogeographical hypotheses at both regional and continental scales. Pronophilines are poorly represented in collections and have never been studied from a modern phylogenetic perspective. A clear understanding of relationships and distributions of monophyletic groups is fundamental to testing hypotheses about diversification and dispersal/vicariance in this diverse butterfly group. This is the premise behind a recent grant, "Molecular systematics and biogeography of South American pronophiline butterflies (*Lepidoptera: Nymphalidae: Satyrinae*)."



The proposed research is specifically looking at (1) the development of a phylogenetic framework for higher-level relationships among satyrine tribes and subtribes and more detailed phylogenetic study of Pronophilina based on molecular data; (2) production of a state-of-the-art monograph and associated phylogenetic analysis, web-based keys, catalogs and identification guides for the putatively monophyletic

group of south-temperate pronophiline genera; (3) training a graduate student in systematics (theory and methods) and classification of little-known lepidopteran groups; (4) development of Web-based interactive specimen data, images, and identification keys; and (5) establishment of links with the global community of systematists working on satyrine systematics to enhance future collaborative research efforts.

This project encompasses field work in the tropical and south-temperate regions of South America, traditional morphological study enhanced by state-of-the-art digital imaging tools, links with ongoing molecular research on nymphalid relationships, and extensive image capture and database efforts. The proposed research project will be enhanced by ongoing research in molecular systematics of *Nymphalidae* and by collaboration with satyrine experts from around the world.

These projects are working toward a comprehensive phylogenetic hypothesis for a major group of organisms composing a valued and apparent portion of the world's biota. The patterns of relationship explored in this research bear upon fundamental questions of the history and biogeography of life in the southern continents. Achieving an enhanced understanding of butterfly diversity patterns is intrinsically worthwhile to a large audience of scientists and nonscientists. Although oft derided as "types of airiness and frivolity," butterflies are key model organisms in a broad range of research and sources of inspiration that engage the public in greater appreciation of science and nature. Improving our understanding of phylogenetic and biogeographical patterns in Andean South America will also provide tools for prioritizing areas of endemism and phylogenetic distinctness that may be in greatest need of conservation. This research also shares expertise and technology with collaborators in developing countries and, via the Internet, with the world. Such grass-root scientific diplomacy and sharing of wealth is of increasing importance to help mend the U.S.'s international image in these threatening times.

I'm also adding pages to the Tree of Life (www.tolweb.org). To date, I have authored or coauthored over 2000 pages, most recently coauthoring pages

with **James S. Miller** on the neotropical moth sub-family *Dioprinae* (*Notodontidae*). In addition, I was elected a member of the Council of the Willi Hennig Society in 2009.

My postdoctoral associate **Josh Ogawa** got a job in November 2008 as director of mosquito surveillance in Houston—great for him, wife Jill, and baby Violet, but a loss for us. We are working hard to replace Josh so the lab work can regain its former high level of productivity.

Graduate student **Jess Matz** was so enthused by our Peru expedition in fall 2008 that she organized a solo trip to Chile in February 2009 to hunt for the butterflies that are the subject of her thesis. It was a great success without the vehicular challenges that we faced in the Andes.

Recent Publications

Elias M., Joron M., Willmott K.R., Kaiser V., Silva-Brandão K.L., Arias C., Gomez-Piñeres L.M., Uribe S., Brower A.V.Z., Freitas A.V.L., Jiggins C.D. 2009. Out of the Andes: patterns of diversification in clearwing butterflies. *Mol. Ecol.* 18: 1716-1729.

Warren A.D., Ogawa J., Brower A.V.Z. 2009. Revised classification of the family *Hesperiidae* (*Lepidoptera: Hesperioidea*) based on combined molecular and morphological data. *Systematic Entomology* 34: 467-523.

Brower A.V.Z. 2009. Stability, replication, pseudoreplication and support. *Cladistics* 25: (in press)

Brower A.V.Z. 2009. *Heliconius tristero* Brower, 1996 and *Heliconius melpomene mocoa* Brower, 1996 (*Lepidoptera: NYMPHALIDAE*): proposed conservation by suppression of *Heliconius melpomene bellula* Brown, 1979. *Bulletin of Zoological Nomenclature* 66: (in press)

Brower AVZ. 2009. Science as a pattern (book review of *Foundations of Systematics and Biogeography*, by D.M. Williams and M.C. Ebach, 2008. Springer, N.Y.). *Systematics and Biodiversity* (in press).

Schuh R.T., Brower A.V.Z. 2009. *Biological Systematics: Principles and Applications*. 2nd ed. Ithaca: Cornell University Press.

from the lab of... John DuBois

In March 2009, DuBois received a grant from LI-COR Biosciences toward the purchase of the LI-6400XT Portable Photosynthesis System. In April, he received a match grant from the MTSU Foundation to finalize purchase of the equipment. Part of the grant provided on-site training at the LI-COR facility in Lincoln, Neb. In June, DuBois spent a week at the corporate facility learning operation of the instrument and toured the manufacturing division and met several of the technicians. The instrument will become an integral part of the Plant Physiology course laboratory.



Graduate student **Misty Griffith** is continuing her research on the isolation of bacteria and fungal species capable of degrading the herbicide atrazine. To date, she has isolated 28 organisms able to grow on minimal salts agar plus atrazine. Her current research is looking at the ability of these organisms to degrade the atrazine.

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As a consultant on the AT&T Junior Science and Technology Project, an outreach program of the MTSU Honors College, DuBois copresented (with Amy Phelps, Chemistry) three workshops for teachers at the Discovery School at Reeves-Rodgers and Hobgood Elementary: A NASA Explorer School. The project funded not only the workshops in May 2009, but will supply additional curriculum materials for implementing hands-on activities in science and technology in the classroom. At the end of the academic year, the consultants will revisit the teachers to follow up on implementation.

Now in his seventh year in the MentorNet Program, the E-Mentoring Network for Diversity in Engineering and Sciences, DuBois is mentoring **Tina Gatzka**, a postdoctoral fellow at the University of Southern California. She is conducting research in the Department of Microbiology and Immunology.

Recent Publications

Newsome A.L., DuBois J.D., Tenney J.D. 2009. Disinfection of football protective equipment using chlorine dioxide produced by the ICA TriNova system. *BMC Public Health* 9:326-333.

Recently Completed Theses

Hanif, Bibi (Nazra). 2009. *Camellia sinensis*: Comparing white tea, green tea, and black tea as to the antiviral, antimicrobial, and allelopathic properties.

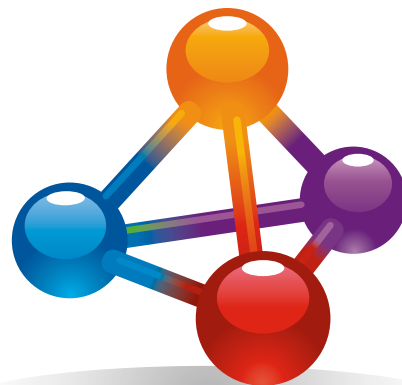


from the lab of Amy Jetton

Laura Wanamaker is working on the effect of angiotensin on vascular smooth muscle cells. She hopes to find an influence of this hormone on hypertrophy, hyperplasia, or cell motility. If she can document an angiotensin effect, she hopes to examine the potential of flavonoid compounds to block angiotensin effects. It is presumed that flavonoids would reduce angiotensin-induced actions via a reduction in available free radicals, known to be produced by angiotensin-activated pathways.

Former Students

Jennifer Freimund (M.S. '07) is currently in a physician's assistant program. **Hilda Azabache** Orrillo (B.S. '07) and her husband had a baby in 2008. **Capri Pace** (B.S. '06) is married and is the mother of a baby boy.



from the lab of **Jeff Leblond**

The Leblond laboratory is in the second year of a grant project called "Sterol Biosynthesis in the Marine Dinoflagellate *Karenia brevis*." The research is examining sterol biosynthesis in *Karenia brevis*, a unicellular, eukaryotic alga of great environmental and economic importance. Preliminary data suggest a more plant-like pathway for *K. brevis* rather than the yeast-like pathway that has been hypothesized to date in other dinoflagellates. The objective of this study is to elucidate important biochemical steps in the biosynthesis of brevesterol and gymnodionsterol, the primary sterols of *K. brevis*, by determining structures of selected intermediates that accumulate during exposure to particular fungicides. This work is the first to elucidate specific biosynthetic steps in the production of *K. brevis* sterols, of particular importance because, despite the significant historical attention given to dinoflagellate sterols as environmental biomarkers for this class of algae, few have turned their attention to how these molecules are produced.

The collaborative work represents a unique opportunity for undergraduate researchers. Students are being trained and are actively participating in the laboratory, reflecting the Project Kaleidoscope (PKAL, www.pkal.org) teaching philosophy, and are exposed to both lipid biochemistry techniques under Leblond's guidance. The chance for undergraduate students to participate in such a project is helping propel them into strong Ph.D. programs at other institutions.

This training and motivation in areas of basic scientific research is an important component of the activities. The forecasted shortfalls in young scientists in the United States is of concern to all, and including students in basic research at earlier points in their careers has been recommended as a means of encouraging more, particularly those from minority and underrepresented student groups, to pursue careers in science (Committee on Science, 2006). The goal is to produce valuable information on a very economically and environmentally important marine alga while at the same time enticing students into this exciting area of biochemistry.

The Leblonds announced the arrival of their third son, Asa, born Easter morning 2009 after two trips to the hospital in the middle of the night.



Recent Publications

Leblond J.D., Lasiter A.D., Li C., Logares R., Rengefors K., Evens T.J. 2010. A data mining approach to dinoflagellate clustering according to sterol composition: correlations with evolutionary history. *Int. J. Data Mining and Bioinformatics*. (in press).

Leblond J.D., Dahmen J.L., Evens T.J. 2009. Mono- and digalactosylacylglycerol composition of dinoflagellates. IV. temperature-induced modulation of fatty acid regiochemistry as observed by electrospray ionization/mass spectrometry. *Eur. J. Phycol.* (in press).

Gray C.G., Lasiter A.D., Leblond J.D. 2009. Mono- and digalactosylacylglycerol composition of dinoflagellates. III. four cold-adapted, peridinin-containing taxa and the presence of trigalactosyldiacylglycerol as an additional glycolipid. *Eur. J. Phycol.* 44:439-445.

Leblond J.D., Lasiter A.D. 2009. Mono- and digalactosylacylglycerol composition of dinoflagellates. II. *Lepidodinium chlorophorum*, *Karenia brevis*, and *Kryptoperidinium foliaceum*, three dinoflagellates with aberrant plastids. *Eur. J. Phycol.* 44:199-205.

Gray C.G., Lasiter A.D., Li C., Leblond J.D. 2009. Mono- and digalactosylacylglycerol composition of dinoflagellates. I. peridinin-containing taxa. *Eur. J. Phycol.* 44:191-197.

Leblond J.D., Roche S.A. 2009. Mono- and digalactosylacylglycerol composition of Chlorarachniophytes (Chlorarachniophyceae): production of a novel lauric acid (12:0)-containing form of monogalactosyldiacylglycerol (MGDG). *Phycologia* 48:101-104.

from the lab of... **Jerry Reagan**

Justin Head completed his master's thesis, "UV-induced Apoptosis in Neuro-2a Cells Occurs in the Absence of Classic Nuclear Biochemical and Morphological Changes," in June 2009. His work focused on the mechanism of cell death in a murine neuroblastoma cell line. This cell line appears to undergo a novel form of cell death that displays some characteristics of apoptosis and some characteristics of necrosis. Failure to undergo cell death at appropriate times is an underlying cause of some cancers. Therefore, new lab members are continuing these studies by focusing on the role of mitochondria and lysosomes in the death of neuroblastoma cells. Neuroblastoma is the mostly commonly diagnosed tumor in infants. In most cases, the disease progresses rapidly. However, in some cases, the tumor undergoes spontaneous repression. Understanding the mechanism of cell death may provide important information that could lead to effective treatment strategies for this devastating disease.

Reagan is also researching the effect of cholesterol concentration on lysosomal biogenesis with Bruce Cahoon, **Patrick Jennings** (undergraduate), and **Aditya P. Mahajan**, (M.S.P.S. student). This work is part of an ongoing study aimed at understanding the relationship between cellular cholesterol metabolism and regulation of a lysosomal enzyme that plays an important role in the induction of apoptosis. Specifically, they are trying to understand how cells accommodate excess cholesterol if they are unable to store it in cytoplasmic cholesterol ester droplets. For these studies, they use a mutant cell line that is unable to release cholesterol from lysosomes. Their immediate goal is to understand whether these cells increase the biogenesis of new lysosomes or expand existing lysosomes. These studies should provide some novel information on the mechanism of lysosomal structure and function

Recent Presentations

Justin Head presented a poster, "The Role of Acid Sphingomyelinase in the Induction of Apoptosis in Neuro-2a Cells," at the 18th annual Southeastern Lipid Research Conference at Calloway Gardens, Ga., in October 2008.

Reagan presented a poster, "Effect of Cholesterol Concentration on Lysosomal Biogenesis," at the 18th annual Southeastern Lipid Research Conference at Calloway Gardens, Ga., in October 2008.

Recently Completed Theses

Justin Head completed his master's thesis titled "UV-induced Apoptosis in Neuro-2a Cells Occurs in the Absence of Classic Nuclear Biochemical and Morphological Changes" in June 2009. He is now a first-year student at the DeBusk College of Osteopathic Medicine in Harrogate, Tenn.



from the lab of... Wayne Rosing

Rosing has been busy working with and identifying various Myxomycete specimens and substrates he collected in Singapore. He received a three-week research fellowship to collect and study the slime molds at the Singapore Botanic Garden in March 2009. Since returning, Rosing has been culturing the slime molds from various substrates and trying to get them into pure culture. In addition, he has been working on identifying the specimens.



Recent Publications

Rosing W.C. 2009. Corticolous Myxomycetes of Singapore Gardens. *Bulletin Singapore* 61(1):151-158.



Poster advertising Rosing's presentation at the Singapore Botanic Garden

from the lab of... Kim Cleary Sadler

The Sadler lab continues working on research projects related to informal learning environments. Graduate student **Karen Metius-House** is on track to finish her thesis comparing student attitude and knowledge about cedar glades (if life doesn't get in the way: she's expecting her second child and recently relocated to North Carolina). **Leigh Gostowski** is examining the impact of the NSF-funded Earth, Energy, and Civilization project on middle school student attitudes and STEM knowledge. Leigh also spent an exciting summer in China, sponsored by NSF, examining the Chinese high school biology curriculum; she currently works in the MTSU Office of Compliance. **Zena Tennenbaum** is completing analysis of a qualitative study of summer science internships at the Great Smoky Mountains Institute at Tremont; she currently serves as a BIOL 1031 GTA.

Undergraduate student **Rebecca Houser** has completed collaborations with Sadler on a cedar glade mapping project with Stones River National Battlefield and Terri Hogan, park ecologist. The project was halted for several months due to the Good Friday tornado, April 10, 2009, which devastated large tracts of glades at the battlefield. Rebecca's completion of the study this year will update records and provide valuable information for management practices at Stones River. This project was a component of another project funded by the National Park Service (\$16,000) titled "Restoration of Glades and Barrens" in which Dennis Mullen served as PI.

Working with Sadler, who serves as Biology 1031 faculty supervisor, former graduate teaching assistants **Morgan Cook-Shivers** and **Laura Eckerd** completed the *Exploring Life Biology 1031* laboratory manual in Fall 2009. Two years in the making, the manual for non-majors has been revised to guide students through five main themes (process of science, cells, chemistry of life, reproduction, genetics and biotechnology). Each lab is two weeks so students will have more time to engage in lab experiences. David Powell, lab coordinator, continues offering advice and support during this first year with the new manual.

cont.

Sadler received the 2009 College of Basic and Applied Sciences Grantsmanship Award for two new National Science Foundation projects. Anthony and Mary Farone and Sadler have had a busy first year launching the NSF GK-12 project: Integrating Teaching, Research, and Industry Applications to Deepen Scientific Understanding. The five-year project (funded for \$2,980,806) is in collaboration with Tennessee State University and involves biotechnology industrial partners, high school biology teachers, and graduate students. While actively maintaining their own research, graduate students spend one year with a biology teacher to advance scientific research in the classroom, with assistance from a designated industrial partner. To improve math and science education in middle Tennessee, Sadler served as co-PI with Rick Vanosdall, director of TMSTEC, on the NSF Robert Noyce Master Teacher Fellowship grant that was funded for \$1,496,765. Due to time commitments on two other NSF awards (EEC and TRIAD), she resigned as co-PI on this project. Michael Rutledge is a mentor teacher advisor and two MTSU biology graduates (**Kim Hinton** and **Candy Swann**) are mentor teachers on this project.

Recent Publications

Winther A., Sadler K., Saunders G. Approaches to Environmental Education. In Bodzin A., Klein B., Weaver S. (Eds), *The Inclusion of Environmental Education in Science Teacher Education*. Springer Publishing Company. (in press)

Schepige A., Morrell P., Smith-Walters C., Sadler K., Munck M., and Rainboth D. *Using Environmental Education Project Curricula with Elementary Preservice Teachers*. (in press)

In Bodzin A., Klein B., Weaver S. (Eds), *The Inclusion of Environmental Education in Science Teacher Education*. Springer Publishing Company.

Recent Presentations

Sadler K., Smith-Walters C. *Noxious Neighbors: Invasive Species in Our Backyards*. MTSU Video Conference Workshop. February 2009.

Sadler K. Out-of-School Learning Experiences with Elementary and Middle School Students. Third Mathematics and Science Education Research Conference. Murfreesboro, Tennessee. February 2009.

Sadler K., Gostowski L. "Empowering Parents in STEM: Family Science Night Activities at School." National Association for Science Teachers International Conference. New Orleans, La. March 2009.

Sadler K. "Exemplary Science Programs—Thinking Outside the Box: No Child Left Inside at Campus School." National Association for Science Teachers International Conference. New Orleans, La. March 2009.

Smith-Walters C., Sadler K., Ambruster C. "Oh Me! Oh My! Mitosis and Meiosis: an Interactive Workshop." National Science Teachers Association National Conference. New Orleans, La. March 2009.

Tennenbaum Z., Sadler K. "A Qualitative Study of the Citizen Science Program at the Great Smoky Mountains Institute at Tremont." MTSU Scholars Day Poster Presentation. April 2009.

Gostowski L., Sadler K. "Storm Chasers: The EEC Project and the Gathering Storm." MTSU Scholars Day Poster Presentation. April 2009.



from the lab of... **Becky Seipelt**

Recent Publications

Thompson M.W., Beasley K.A., Schmidt M.D., Seipelt R.L. 2009. "Arginyl aminopeptidase-like 1 (RNPEPL1) is an alternatively processed aminopeptidase with specificity for methionine, glutamine, and citrulline residues." *Protein and Peptide Letters*. 16(10):1256-66.

Recent Presentations

Newsome A.L., Johnson J.P., Seipelt R.L., Thompson M.W. 2008. "Apolactoferrin Inhibits a Low Molecular Weight Isoform of MMP-2 by a Zinc Chelation Mechanism." American Society for Cell Biology (ASCB), Washington, D.C.

Hicks S.S., Seipelt R.L. 2008. "Alternative mRNA splicing is prevalent in genes and regions of the brain implicated in bipolar disorder." Tennessee Academy of Science.

Beasley K.A., Thompson M.W., Seipelt R.L. 2008. "Arginyl aminopeptidase-like 1 (RNPEPL1) is alternatively produced neutral aminopeptidase with specificity for citrulline, methionine, and glutamine residues." Tennessee Academy of Science. (First place award)

Gilani A., Thompson M.W., Seipelt R.L. 2009. "Cloning, expression, and purification of tissue inhibitor of metalloproteinase-2 (TIMP-2)." MTSU Scholars Week.

Singh P., Guleryz S., Thompson M.W., Seipelt R.L. 2009. "Cloning, expression, and purification of human matrix metalloproteinase-14 (MMP-14)." MTSU Scholars Week. (Tied for second place award)



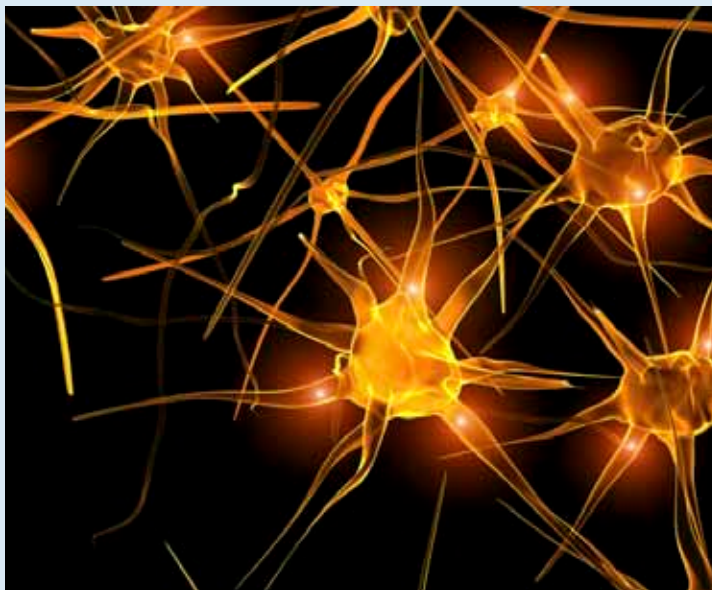
Thompson M.W., Seipelt R.L. 2009. "Interaction of lactoferrin with MMP-2 and Pro-MMP-2." MTSU Scholars Week.

Crouse M.T., Swift R.E., Reagan J., Seipelt R.L. 2009. "Mechanism of reduced SMPD1 activity in Niemann-Pick Disease." MTSU Scholars Week.

Hicks S.S., Seipelt R.L. 2009. "Alternative mRNA splicing is prevalent in genes and regions of the brain implicated in bipolar disorder." MTSU Scholars Week.

Beasley K.A., Schmidt M.D., Thompson M.W., Seipelt R.L. 2009. "Arginyl aminopeptidase-like 1(RNPEPL1) is an alternatively produced neutral aminopeptidase with specificity for citrulline, methionine, and glutamine residues." MTSU Scholars Week.

Romer C.E., Seipelt R.L. 2009. "Laeferin and LTA4H mRNA splicing in normal and cancerous human tissues." MTSU Scholars Week.



from the lab of... Jeffrey Walck

The Walcks returned in July 2009 from Australia and have resettled back in Murfreesboro. Where did the two years go? They cracked the mystery of seed germination of Guinea flowers (dominant shrubs in temperate Australia), figured out the relationship of seed dormancy and smoke-cued germination among fire ephemerals, and worked on several other difficult-to-germinate plants used for mining restoration. Kings Park and Botanic Garden and the University of Western Australia were wonderful places to work, and Perth was a terrific place to live. In all, they traveled to eight countries over the past two years. Now, they are busy writing up their research and reflecting on their time overseas.

In April 2009, they served as Visiting Scientists to Taiwan, sponsored by the Taiwan National Research Council and the Taiwan Forestry Research Institute. Jeff gave a seminar on climate change at the Nation-

al Taiwan University, and Siti presented her work on fire-stimulated germination at the Taiwan Forestry Research Institute. Both enjoyed visiting and meeting the scientists in the seed laboratory at the Taiwan Forestry Research Institute. A three-day field trip encompassed the subtropical forest at Fushan Research Center (see picture) to the mixed coniferous forest in the Shei-Pa National Park at 5,900 ft and, finally, to Mt. Hehuan in the Taroko National Park at 10,745 ft. In addition to the beautiful plants and landscape, they visited Taipei 101 (tallest building in the world), historical places, and the Shilin Night Market, ate rice wine chicken soup, experienced a 5.5 earthquake, and sampled betel nuts. Son Edwin mastered chopsticks.



The Walcks at Fushan Botanic Garden with hosts Dr. Ching-Te Chien and Dr. Chau Chin Lin.

BIOLOGY CLUB

Officers for 2009-2010

Andy Standley, President

Activities of former members

Bahareh Tahriri is in the M.S.P.S. program at MTSU. **Eddie Calhoun** is working in his own clinic in Alabama. **Brian Long** is a legal assistant in Nashville. **Melanie Messina Wilk** is a project manager for clinical trials in Virginia. **Nick Zeger** has started osteopathic school. **Eterial Burrell** is working for Americorp in Nashville. **Cayce Owens** is working at Emory University.

Student presentations

Nicole Y. Foster and John M. Zamora. 2009. "Antibacterial, antifungal, antiviral, and allelopathic effects of *Eriodictyon californicum*." Tennessee Academy of Science meeting.

Robert S. Richardson and John M. Zamora. 2009. "Isolation and identification of cellulose-degrading microorganisms." Tennessee Academy of Science meeting.

Justin M. Sadd and John M. Zamora. 2009. "Anti-bacteriophage activity of herbal teas." Tennessee Academy of Science meeting.



Eterial Burrell and John M. Zamora. 2009. Isolation and identification of microbes that degrade Sevin-10 insecticide using biometric analysis. MTSU Scholars Week.

Gina M. Cullerton and John M. Zamora. 2009. How to build a better mouse trap: sanitation issues in the food industry. MTSU Scholars Week.

Payal L. Gupta, Mohammed S. Mahmood and John M. Zamora. 2009. Anti-microbial properties of Melaleuca oil. MTSU Scholars Week.



Rebecca Houser, Catherine Chokuba, Brett Baker, Tameka Hubbard, Andy Standley, and Doyin Ijiyode on a November 21, 2009, Biology Club trip to Tim's Ford State Park

Biology Department Scholarship Winners, 2009

Each year, the faculty are honored 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 Biology Department is pleased to offer a number of scholarships. Although these include monetary awards, their intention is to recognize students for efforts above and beyond the expected. The faculty congratulate each and every recipient.

Clay M. Chandler Outstanding Freshman Award

David Antonelli, Rachel Lytle

Ralph E. Sharp Outstanding Sophomore Award

Savanah Yokley

Philip M. Mathis Outstanding Junior Award

Shannon Murphy

Peter I. Karl Outstanding Senior Award

Shannon Roche

Maria de los Reyes Microbiology Scholarship

Shannon Roche

C.W. Wiser Medical/Allied Health Award

Theresa D. Myers, Hyo Park

George G. Murphy Research Scholarship

Jacob Hall

Stephen M. Wright Research Scholarship

Jacob Hall

John M. Zamora Graduate Research Scholarship

Lacy Danikas

John D. DuBois Scholarship

Jenny Maloney

Sarah F. Barlow Scholarship

Lacy Danikas

Thomas E. Hemmerly Graduate Research Scholarship

Jerrod Shipman

Mary C. Dunn Graduate Scholarship

Lacy Danika

J.L. Fletcher Graduate Scholarship

Joshua Youssef

Charles Holland Biology Club Scholarship

Alison Jordan

Marion R. Wells Graduate Research Scholarship

David Landry

Dennis Mullen Vertebrate Biology/ Aquatic Biology Research Scholarship

Lacy Danikas

William H. Butler, Jr. Graduate Research Scholarship

David Landry

Brian Miller Graduate Research

David Landry

Elliott Dawson BioVentures/Biotechnology

Jacob Hall

Padgett Kelly Research Scholarship

Lacy Danikas

David Sanborn Ecology Scholarship

Rebecca Houser

Sarah H. Swain Undergraduate Scholarship

Jacob Hall, Shannon Roche

Wayne Rosing Biology Scholarship

Rebecca Houser

Incoming Freshman Scholarships 2009-2010

Mary C. Dunn Freshman Scholarships

Austin Thomas, Collierville High School, Collierville
Anthony Casamassima, Home School Student, Unionville

Patrick J. Doyle Freshman Scholarship

Ashleigh Merritt, Arlington High School, Arlington, TN

Ellis Rucker Freshman Scholarship

Macy Swanager, Smyrna High School, Smyrna, TN

Theses Completed (2009)

The Biology Department is pleased to have graduated 11 students with the Master of Science degree in Biology during the 2009 ceremonies. Nationwide, Middle Tennessee State University is a leader in producing master's level graduates. Thesis topics have included research on viruses, bacteria, angiosperms, amphibians, reptiles, fishes, and mammals. Students investigated morphology, diversity, physiology, molecular genetics, biochemistry, and antimicrobial activity.

Students, their graduation years, thesis titles, and faculty advisors are. A complete list of all theses completed to date in the Biology Department can be found at www.mtsu.edu/~jddubois/3230/theses.html.

Bishop, Crystal L. 2009. Evaluation of the potential for gene flow among benthic stream fishes inhabiting small tributaries of a reservoir. (Dennis Mullen, advisor)

Hanif, Bibi N. 2009. *Camellia sinensis*: Comparing white tea, green tea, and black tea as to the antiviral, antimicrobial, and allelopathic properties. (John DuBois, advisor)

Harris, Kelly L. 2009. Cross-talk among gp130 cytokines in adipocytes. (William Stewart, advisor)

Head, Justin M. 2009. UV-induced apoptosis in neuro-2a cells occurs in the absence of classic nuclear biochemical and morphological changes. (Jerry Reagan, advisor)

Hensley, Heather M. 2009. The use of endosomal pathway inhibitors to investigate CC99 infection of protozoan and mammalian cells. (Mary Farone, advisor)

Maloney, Jenny G. 2009. Studies on *Trypanosoma cruzi* in Tennessee. (Anthony Newsome, advisor)

Massey, Diane E. 2009. Thermal effects on prey preferences in common Kingsnakes (*Lampropeltis getula*). (Vince Cobb, advisor)

Romer, Carrie E. 2009. Human laeverin and leukotriene A4 hydrolase transcripts are alternatively spliced to encode potential protein variants in normal and tumor tissues. (Becky Seipelt, advisor)

Sharpe, Richard M. 2009. *Zea mays* mesophyll and bundle sheath chloroplast developmental and differential transcript abundance. (Bruce Cahoon, advisor)

Stewart, David R. 2009. Age and growth of blue catfish, *Ictalurus furcatus* (Lesueur, 1840), among three exploited and one unexploited waterbody in Tennessee. (George Benz, advisor)

Tolley, Amy M. 2009. The effects of polychlorinated biphenyls (PCBs) on hatching success, morphology, time to death, and gonadal differentiation of the Cope's Gray Treefrog, *Hyla chrysoscelis*. (Frank Bailey, advisor)

Full-Time Temporary and Adjunct Faculty Continue Playing Major Roles

The combination of increased enrollments and decreased funding is challenging 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 hired six full-time temporary faculty and four adjunct faculty. Five of the ten temporary/adjunct faculty hold the doctoral degree and four hold master's degrees.

These faculty are teaching Human Anatomy and Physiology I and II, Exploring Biology (non-majors biology), Microbiology, Genetics, Radiation Biology, Ornithology, and Comparative Anatomy of Vertebrates. Considering the expertise of each of these instructors, their students are obviously getting a great education. Their service to the department helps fill instructor roles in an ever-increasing number of course sections and replace research faculty who have received grants and/or contracts with 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 grateful for their service.

Full-Time Temporary

Steve Edwards, B.A., 1973, Ph.D., 1980, University of California-San Diego. Teaching: Biology 2011 and 2021 Anatomy and Physiology labs

Christopher Brian Manning, B.S. 1996, M.S. 1998, MTSU; Ph.D. 2003, University of Vermont. Teaching: Biology 2011 Anatomy and Physiology labs, Biology 2231 Microbiology labs

Amy Massengill, B.S. 1993, Stetson University; D.V.M., 1997, University of Florida. Teaching: Biology 2011 Anatomy and Physiology lab, Biology 3021/5021 Comparative Anatomy of Vertebrates lab

Mary Matthews, B.S., 1992; M.S., 2002, MTSU. Teaching: Biology 2011 and 2021 Anatomy and Physiology labs

Teresa Stegall-Faulk, B.S., 1997; M.S., 2000, MTSU. Teaching: Biology 2010 Anatomy and Physiology and Biology 2021 Anatomy and Physiology labs

Michael Thompson, B.S., 1993, University of Louisville; Ph.D., 2000, University of Kentucky. Teaching: Biology 2011 Anatomy and Physiology labs, Biology 3250 Genetics

Adjunct Faculty

Bipin Agarwal, B.Sci. 1975, Bareilly College (Agra, India); M.E., 1981, University of Virginia. Teaching: Biology 4150 Radiation Biology

Matthew Dodd, B.S. 1999, M.S.T. 2001, MTSU; Ed.D. 2008, Tennessee State University. Teaching: Biology 1030 Exploring Life and Biology 2011 Anatomy and Physiology Lab

Cecil Monty Halcomb, B.S. 1969, M.S. 1974, MTSU. Teaching: Biology 6130 Ornithology

Richard D. Martin, B.S. 1974, MTSU. Teaching: Biology 3220 Environmental Regulations and Compliance

Students Accepted to Professional Schools, Fall 2009

We're pleased to announce the acceptance of sixteen biology majors into medical programs for Fall 2009. These students are in programs leading to the M.D., O.D., D.O., D.D.S., Pharm.D., and D.C. degrees. Congratulations and best wishes to all!

Sweeti Bhakta, College of Medicine,
University of Tennessee Health Science Center

Nathan Cassell, College of Medicine, East Tennessee State University
and University of Tennessee Health Science Center

Payal Gupta, DeBusk College of Medicine, Lincoln Memorial University

Christie Hancock, College of Medicine, East Tennessee State University

Justin Head, DeBusk College of Medicine, Lincoln Memorial University

Megan Imboden, College of Medicine,
University of Tennessee Health Science Center

Kristin Kaelin, College of Dentistry, University of Louisville

Ashley Ladd, Medical Technology Program, Vanderbilt University

Hoa Nguyen, College of Pharmacy,
University of Tennessee Health Science Center

Hyo Park, Medical Technology Program, Vanderbilt University

Adam Pflum, College of Medicine, Wake Forrest University

Sana Shaikh, College of Pharmacy, Auburn University
and University of Tennessee Health Science Center

Phil Singer, DeBusk College of Medicine, Lincoln Memorial University

Kyle Standley, College of Pharmacy, Union University

Ralph Stewart, School of Medicine, Meharry Medical College

Kyle Webb, College of Chiropractic, Logan University



Graduate Teaching Assistants for 2009-2010

For the 2009-2010 academic year, the department is providing support to 27 outstanding graduate students who serve as graduate teaching assistants (GTAs). Sixteen of these students have received undergraduate degrees from colleges and universities other than MTSU. Nine of this year's assistants hold baccalaureate degrees in subjects other than biology (animal sciences, chemistry, education and behavioral sciences, environmental sciences, international relations, professional studies, water resources and environmental biology). Spring Gilson holds two baccalaureate degrees, one in biology from Martin Methodist College and one in chemistry from MTSU. All have the requisite training in biology to serve as teaching assistants. Without these GTAs the department couldn't offer the numerous sections of BIOL 1030 for non majors and the freshman courses for majors (BIOL 1110/1120) or some sophomore and junior laboratories. These people are especially important considering the hiring freeze due to budget limitations. The Biology Department is very pleased to have them with us.

Michael Anderson, B.S. in biology, MTSU

Deryk Bellow, B.S. in biology, MTSU

Chris Bowman, B.S. in education and behavioral science, MTSU

Patrick Cusaac, B.S. in biology,
Western Carolina University

Daniel Estabrooks, B.S. in biology,
University of Tennessee-Knoxville

Julie Folks, B.S. in international relations, MTSU

Spring Gilson, B.S. in biology,
Martin Methodist College; in chemistry, MTSU

Misty Giffith, B.S. in biology,
Tennessee Technological University

Andrea Huff, B.S. in biology,
University of Tennessee-Knoxville

Brian Huber, B.S. in environmental sciences,
MTSU

Justin Hutcherson, B.S. in biology,
University of Tennessee-Martin

Ryan Johnston, B.S. in biology,
University of Tennessee-Martin

Andrea Larsen, B.S. in biology, MTSU

Justin Lee, B.S. in animal sciences,
University of Tennessee-Martin

Christy McClain, B.S. in biology,
Tennessee Technological University

William Monroe, B.S. in water resources and
environmental biology, Heidelberg College

Katy Motheramgari, B.S. in biology, MTSU

Billy Plant, B.S. in chemistry,
Tennessee Technological University

Angela Ray, B.S. in professional studies, MTSU

Eric Salmon, B.S. in biology, MTSU

Ryan Seddon, B.S. in biology,
University of Tennessee-Knoxville

Jerrod Shipman, B.S. in biology,
Bowling Green State University

Suzanne Staley, B.S. in biology,
David Lipscomb University

Kenneth Tucker, B.S. in biology,
Athens State University

Eric Vick, B.S. in biological sciences,
University of Tennessee-Knoxville

Derek Young, B.S. in biology,
Trevecca Nazarene University

Joshua Youssef, B.S. in chemistry, MTSU

Cedar Glade Studies

by Kim Cleary Sadler

Mark your calendar for the Elsie Quarterman Cedar Glade Wildflower Festival at Cedars of Lebanon State Park, April 30 - May 2, 2010. Dr. Elsie Quarterman will be 100 years old this year! The Center for Cedar Glade Studies will celebrate Dr. Quarterman's centennial year with her family and friends throughout the weekend; plan to be there! The festival begins Friday, April 30, at 7 p.m. with an evening program at the Cedar Forest Lodge and continues through Sunday, May 2, with hikes, presentations, and other events. Don't let bad weather stop you from attending because most scheduled sessions proceed rain or shine!

The expression "Time flies when you're having fun" seems most appropriate as the Center for Cedar Glade Studies (CCGS) begins a fifth year of operation. The CCGS team continues to operate with goals to provide research opportunities on the ecology of glades, increase educator knowledge and skills about glades, act as a clearing-house to provide information on glades to the public, and create a network of organizations to



Melissa Turrentine and Dr. Elsie Quarterman (98.5 years old!)

identify research and outreach needs. A Science Advisory Council meets annually to oversee CCGS operations and current members are **Terri Hogan** (B.S. '95), National Park Service (chair); Sally Rollins Palmer, Tennessee Nature Conservancy (vice chair); Bill Wolfe, USGS; Milo Pyne, Nature-Serve; John Froeschauer, Tennessee State Parks; and from the MTSU faculty, **Vince Cobb, Tom Hemmerly, Cindi Smith-Walters, Kim Cleary Sadler, and Jeff Walck.**

The third Research Roundtable, held at Cedars of Lebanon State Park May 1, 2009, was attended by 21 representatives from multiple organizations with research and management interests in cedar glades. The fourth Research Roundtable is scheduled for April 30, 2010, at Cedars of Lebanon State Park. If you are interested in attending, contact Kim Sadler, ksadler@mtsu.edu.



Terri Hogan, Carol Baskin, Kurt Blum, Melissa Turrentine, Dwayne Estes (L to R)



cont.

The 2009 Elsie Quarterman Cedar Glade Wildflower Festival was a huge success in spite of a weekend of nonstop rain. Dwayne Estes, Austin Peay State University, presented *Vegetation Changes in the Middle Tennessee Cedar Glades Over Time* for the Friday evening program. There was something for everyone on Saturday as MTSU faculty and graduates filled the program. There was a presentation about snakes in middle Tennessee by **Vince Cobb**, hikes led by **Tom Hemmerly** and **Kurt Blum**, a program on wildflowers of the glades by **Land-on McKinney**, an early morning bird hike led by **Melissa Turrentine**, a workshop on wild edible foods with **Sharon Bracey**, and a talk on invasive exotic pest plants by **Terri Hogan**. Carol and Jerry Baskin, former students of Dr. Quarterman, led hikes and also presented "Cedar Glade Plant Seed Germination." Other presenters included Darel Hess, who conducted a photography workshop; Rita Venable, who hiked with participants to find butterflies; state geologist Ron Zurawski, who spoke about glade geology; and Ken Oeser, who conducted cave tours. The weekend events were planned and coordinated by **Kim Sadler** and Buddy Ingram, ranger-naturalist at Cedars of Lebanon.



Kurt Blum, Terri Hogan, Melissa Turrentine (L to R)

The CCGS office is located in the Fairview Building, room 202. Excellent resources are available for anyone interested in teaching about cedar glades. The *Cedar Glade Educator Activity Guide* and *Flatrock Glade Plant Guide* and DVD are new sources of information for teaching about limestone cedar glades. Also available to those who simply appreciate cedar glades: *Cedar Glade Endemic*

Plants poster, *Cedar Glade* pamphlet, and *A Visit to the Limestone Glades* DVD. For any of these resources, contact **Kim Sadler** (ksadler@mtsu.edu) or the Center for Cedar Glade Studies (gladecenter@mtsu.edu). For more information about the Center for Cedar Glade Studies, visit the Web site www.mtsu.edu/~gladectr. ●



Dwayne Estes and Jerry Baskin



TAS holds 119th Annual Meeting

The 119th annual meeting of the Tennessee Academy of Science was held October 29-30, 2009, at the Carolyn P. Brown University Center at the University of Tennessee, Knoxville. The Biology Department showed an unusually low number of student and faculty papers. However, the department continues its strong support of the Academy with a number of faculty members serving as officers, committee chairs, and committee membership.

The plenary lecture, "Will Our Great Smoky Mountains Someday Go Up in Flames?," was presented by Dr. Henri D. Grissino-Mayer, associate professor and director of the Laboratory of Tree-Ring Science, Department of Geography, The University of Tennessee, Knoxville. This year's symposium, "What's New In STEM Education," was conducted by Drs. Linda K. Jordan and Richard Audet, Tennessee Department of Education. The workshop addressed the new Tennessee Science Standards for those in higher education who help train pre-service teachers. The new mandatory standards will affect all in higher education regardless of discipline.

Dr. M. Gore Ervin served as president and Dr. Cindi Smith-Walters served as past president. Dr. Kim Cleary Sadler chaired the Education Committee, while Dr. Cindi Smith-Walters chaired the Long-Range Planning Committee and served on the Education Committee. Dr. Charles McGhee chaired the Fellows Committee and Dr. George Murphy chaired the Necrology Committee. Drs. Ervin and Smith-Walters also served on the Nominating Committee. At the annual meeting, Dr. Michael Thompson moderated the Cellular and Molecular Biology section, while Dr. John Zamora moderated the Microbiology section.

The 120th Annual Meeting of the Tennessee Academy of Science will be at Tennessee Technological University in Cookeville. Papers and posters presented at the 2009 meeting are listed below with student authors or coauthors designated with an asterisk (*).

Papers Presented

Michael W. Thompson, Caroline A. Spencer-Green*, Rebecca L. Seipelt, "Interaction of Apolactoferrin with the Hemopexin Domain of Pro-MMP-2."

Ryan Seddon,* Matt Klukowski, "The Effects of Short-Term Stress on Corticosterone, Leukocytes, and Prostaglandin E2 in Male Southeastern Five-Lined Skink (*Plestiodon inexpectatus*)."

Lacy Danikas,* Vincent Cobb, "Temperature effects on Locomotor Performance in a Latitudinally Widespread Species, *Nerodia sipedon*."

Merranda D. Holmes,* Stephen M. Wright, "*Bacillus pumilus* Endospores: A Possible Model for Detection of *Bacillus anthracis*."

Shannon B. Murphy,* Stephen M. Wright, "A Label-Free Method for Detection and Differentiation of *Bacillus spp.* Endospores."

Nicole Y. Foster,* John M. Zamora, "Antibacterial, Antifungal, Antiviral, and Allelopathic Effects of *Eriodictyon californicum*."

Robert S. Richardson,* John M. Zamora, "Isolation and Identification of Cellulose-Degrading Microorganisms."

Justin M. Sadd,* John M. Zamora, "Antibacteriophage Activity of Herbal Teas."

Carly Neilson,* Hailey Burton,* Lacy Danikas,* Vincent Cobb, "Effect of Substrate on the Locomotor Performance of Recently-Fed Northern Watersnakes."

Internships: Students Receive Valuable Training

The department continually emphasizes learning outside the classroom. Internships allow students to get practical, on-the-job, experience while still in school. The student intern earns credit and sometimes is paid. Interested students should contact Dr. Murphy or Dr. Seipelt for more information. Student interns for fall 2009 and spring 2010 are listed below, along with the locations for their internships.

Fall 2009

Kelley Oliver

BioMimetics Therapeutics, Brentwood

Jacob Hall

Orchid Cellmark, Nashville

Prashant Singh

Nodality, Franklin

Varuna Mohan

Sarah Cannon Cancer Institute, Nashville

Bhawana Bhawana

DNA resources, Vanderbilt University, Nashville

Thomas Donohoe

DNA resources, Vanderbilt University, Nashville

Michael Hann

DNA resources, Vanderbilt University, Nashville

Nicole Young

DNA resources, Vanderbilt University, Nashville

Spring, 2010

Kristina Hulseley

DNA Resources, Vanderbilt University, Nashville

Robert Richardson

Vi-Jon, Smyrna

Suzanne Staley

Esoterix Center for Innovation, Brentwood



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BioUpdate

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department chair

John D. DuBois, editor

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Brian Miller

Kim Cleary Sadler

Becky Seipelt

Cindi Smith-Walters

Let us hear from you...



If you know alumni who did not receive this newsletter, please ask them to send us their contact information. We also want to continue to feature the accomplishments of alumni, and we encourage you to update us often!

Name _____

MTSU degree/year _____

Address _____

City/state/zip _____

Telephone _____ E-mail _____

Professional/job information _____

Personal news of interest (Example: Names of children, honors received, etc.)

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