



Bio Update

Biology Department, Middle Tennessee State University, Spring 2009



Chair's Message

Greetings from the faculty, staff, and students of the Biology Department. We produced two versions of BioUpdate this year, one being a much smaller edition to be mailed and a second, more typical version that can be found on our recently updated departmental Web site (www.mtsu.edu/biology/). This is one way we are coping with budget decreases that have occurred and others that are anticipated. It appears that construction of the new science building will be delayed again, and state support for higher education will continue the downward trend. However, we still have a great faculty and many students who would excel at any university, and you can be assured that we are all working to preserve the high-quality educational experience for which our department is known. Faculty and students continue to win awards, receive grants, publish in national peer-reviewed journals, and excel in service activities at record levels, and I encourage you to take a few moments to look at the online newsletter and annual reports for specifics. We look forward to visiting with the many alumni who stop by. Feel free to e-mail me news of your career (gmurphy@mtsu.edu) or visit just to say hello.

—George Murphy

Biology Well Represented at Annual

SCHOLARS WEEK

The MTSU University-wide Scholars Week was held March 31–April 4, 2008.

The annual event originated as Scholars Day but has evolved into the current Scholars Week. The agenda includes various lectures and performances, hands-on learning showcases, and the University-wide exhibition of posters, presentations, and performances. The overall goal of Scholars Week is to showcase a multitude of research along with other scholarly and creative activities across the MTSU campus. It is a chance for the University community to see the activities and productivity of the various colleges and departments. The event involves a tremendous amount of planning and coordination. However, it has always been very well attended.

The event allowed the Department of Biology to display its diverse research programs as well. Twenty-two Biology



faculty along with 15 graduate students and 21 undergraduate students contributed in the presentation of 40 papers and posters at the University-wide exhibition held in Murphy Center. This total represents a 21 percent increase in the number of papers/posters presented at the 2007 Scholars Week. In addition, the MTSU Center for Environmental Education activities (Center for Cedar Glades Studies, TAMP, Waterworks!, Tools for Schools) were highlighted during the week.

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Internships: Students Receive Valuable Training

Internships are a great way for students to get on-the-job type training while they are still in school. Interns work in government labs or in private industry doing many of the things that would be expected of them if they were full-time employees. At the same time, they can earn college credit (BIOL 3200, two to four hours). Each student gains valuable experience to aid in making decisions regarding a career and/or further academic training. Internships are available during each semester and the summer.

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Scholars Week *continued from p. 1*

Faculty Presentations

Stanton Belford presented "Monitoring the Distribution of Coral 'Reef-Builders' Growing in Harsh Environmental Conditions."

Vince Cobb, Frank Bailey, Matt Klukowski, and Timothy Worrall (graduate student) presented "Stress Response of Free-Living Cottonmouths (*Agkistrodon piscivorus*) to Human Disturbance."

Brian Miller (pictured) and **Matthew Niemiller** (graduate student) presented "Distribution and Relative Abundance of Tennessee Cave Salamanders."



Brian Miller, Matthew Niemiller (graduate student), and **Daniel Estabrook** (graduate student) presented "A Conservation Dilemma in Middle Tennessee: The Streamside Salamander versus Suburban Sprawl."

Brian Miller and Matthew Niemiller (graduate student) presented "Chronicle Life Underground: Egg-Laying Behavior and Interactions among Female Red Salamanders."

Anthony Newsome, Jon Johnson



(graduate student), **Rebecca Seipelt, and Michael Thompson** (pictured) presented

"Apolactoferrin Inhibits the Catalytic Domain of Matrix Metalloproteinase-2 by Zinc Chelation."

Michael Thompson presented "Differential Localization of MMP-2 Isoforms in Autoimmune Thyroid Tissue."

Mary Farone and Anthony Farone (and others) presented "Simulation of the Dynamics of Protein Chains."

Steve Howard presented "Sequence Evolution in Recombining and Non-Recombining Lineages of Freshwater Snails."

Graduate Student Presentations

Andrew McElwain (graduate student) and **George Benz** (faculty) presented "Infection Patterns of Copepods *Kroeyerina elongate* (Kroyeriidae, Copepoda) on the Blue Shark."



Nazra Haniff and John Zamora (faculty) presented "Antimicrobial and Allelopathic Properties of *Camellia sinensis*."



Alicja Kutyla presented "Gunshot Residue on Bone as a Potential Indicator of Gunshot Trauma in the Absence of a Bullet."

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Departmental Logo Shirts and More

The department is selling shirts, coffee mugs, and water bottles that sport the departmental logo. The shirts come in five styles: a light tan short-sleeve or long-sleeve t-shirt with the logo on the front and an enlarged color logo on the back, a dark green short-sleeve or long-sleeve polo shirt with the logo on the front, and a long-sleeve denim shirt with the logo on the front. Several faculty members and students have been seen wearing the shirts. The coffee mugs are white with the logo in blue on both sides. The water bottles are 500 mL (16+ oz.) in blue plastic with a white logo.

T-shirts

Short-sleeve, \$10
Long-sleeve, \$12

Polo shirts

Short-sleeve, \$20
Long-sleeve, \$25

Denim shirts

(long-sleeve), \$28

Coffee mugs, \$3

Water bottles, \$4



Front logo on Polo Shirt



Back Logo on T-shirt

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

Department Welcomes New Faculty and Staff

The department is happy to welcome one new faculty member and three new staff members over the past year. Our new faculty member is Dr. Chris Herlihy, who joined the department in fall 2008. The Biology office welcomed new staff members Ms. Becky Elrod (March 2008) and Ms. Lyn Powers (June 2008). In spring 2008, Mr. David Powell, formerly a temporary faculty member in the department, became the full-time laboratory coordinator overseeing the BIOL 1031, 1111, and 1120 laboratories.



Chris Herlihy is a native of Toronto, Canada. He completed his B.Sc. in biology (honors) at McMaster University in Hamilton, Ontario. His honors thesis was completed under the supervision of Dr. Susan Dudley. Chris

earned his Ph.D. in biology at Queen's University in Kingston, Ontario, under the direction of Dr. Chris Eckert. His dissertation title was "Reproductive Assurance and the Evolution of Self-Fertilization in *Aquilegia canadensis*." From 2004 until his appointment at MTSU, Chris worked as a postdoctoral fellow in the lab of Dr. Lynda Delph, at Indiana University, studying the evolution of sexually dimorphic flower traits. His current research has been studying self-fertilizing and outcrossing taxa of Glade Cress *Leavenworthia* in the cedar glades. He is investigating varia-

tion in the mating systems as well as variation in flower color within these cedar glade endemic species. Chris and his fiancée, Ingrid Anderson, a clinical research specialist at the Sarah Cannon Cancer Institute in Nashville, live in Murfreesboro. When not at work, they both enjoy outdoor activities, including hiking and kayaking.



Rebecca (Becky) Elrod started in the Biology Department office as a temporary in March 2008 and was hired as a secretary in June 2008. She is an MTSU graduate with a B.S. in psychology.

She lives in Murfreesboro with her husband, David, and children Clayton and Grace.



Lyn Powers started in the Biology Department in June 2008 as the department's technical clerk, managing budgets and accounting. She has worked at MTSU for the past eight

years in Phillips Bookstore and the Post Office. Before MTSU, Lyn worked at Arizona State University, California State University at Sacramento and at San Bernardino, and at a technical school in Missoula, Montana. She and her family (husband, Nick, and sons

Tyler and Spencer) moved to Murfreesboro in 2000 and enjoy the middle Tennessee area very much.



David Powell is a Murfreesboro native who attended Oakland High School before earning a bachelor's degree from MTSU in May 1999. After narrowing his interests to biology,

he served as a GTA while completing the department's Master of Science in Teaching program. Enjoying the interaction with students, David proceeded to spend the next six years teaching full-time for MTSU's Biology Department. The wide variety of courses that he taught included Topics in Biology and Life Science for Elementary Educators as well as Genetics, Microbiology, and Human Anatomy and Physiology labs. David was hired to the position of biology lab coordinator in April 2008 and now spends his time ensuring that the BIOL 1031, 1111/1121, and 2011/2021 labs run smoothly. Kerri Powell, David's wife of eleven years, is also an educator. She teaches second grade at Stewartsboro Elementary in Smyrna. In their time away from work, David and Kerri are involved with college ministry, and they also enjoy traveling, hiking, and other outdoor pursuits. When they are enjoying their leisure time, their two black Labrador retrievers can usually be found enjoying it with them.

Internships *continued from p. 1*

Several new industry internship collaborations have been recently established. Due to the efforts of the Biotechnology Resource Group, internships are now available at Warner Laboratories, BioMimetic Therapeutics, Environmental Science Corporation, Human Genetics Computational Genomics Core Facility, and GenHunter. Interested students should contact Dr. Murphy or Dr. Seipelt. This past year's student interns are listed below.

Spring 2008

Emily Vest

Vanderbilt University Mouse Phenotype Core Facility, Nashville

Brianne Begley

Vi-Jon, Smyrna

Emenike Okafor

Meharry Medical School, Human Research Ethics, Nashville

Summer 2008

Nena Bowman

Esoterix Center for Innovation, Brentwood

Kayla Payne

Sarah Cannon Research Institute, Nashville

Ashley Elliott

Tennessee Bureau of Investigation, Nashville

Prudhvi Perati

Vi-Jon, Smyrna

Leonella Carriedo

Department of Plant Biology, Stanford

University, Stanford, California

Shannon Roche

Environ, Brentwood

Kyle Williams

National Institute on Drug Abuse, NIH,

Baltimore, Maryland

Fall 2008

Nicholas Chamberlain

Orchid Cellmark, Nashville

Carrie Romer

Vi-Jon, Smyrna

Spring 2009

Aditya Mahajan

ABDiagnosics, Brentwood

Nida Shirazi

BioMimetics Therapeutics, Brentwood

Katyayani Motheramgari

Esoterix Center for Innovation, Brentwood

Will Jordan

Orchid Cellmark, Nashville

Nadiar Yakob

Orchid Cellmark, Nashville

Joseph Smith Jr.

Sarah Cannon Research Institute, Nashville

Karen Beasley

Cardiovascular Biology, Vanderbilt University, Nashville

Jeremy Friesen

Medical Technology, Vanderbilt University, Nashville

Saffett Guleryz

Cancer Biology, Vanderbilt University, Nashville

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In Memoriam: Dr. C. Wymer Wiser

It is with great sadness the department reports the loss of Dr. C. Wymer Wiser. Dr. Wiser passed away Dec. 21, 2008. He is survived by his wife of 63 years, Laura Gribble Wiser, along with sons Cy and Gary and their families. Not only was Dr. Wiser a well-respected professor in the Biology Department for 39 years, he also preached and taught Bible classes

at Minerva Drive Church of Christ, where he was a member.

Dr. Wiser joined MTSU in 1956 and continued to serve the University and the department until he retired in 1995. After his retirement, Wymer continued his service to the community by speaking at different churches in the area and conducting funerals and weddings, and he spent considerable time visiting sick and shut-in people in nursing homes and hospitals.

During his 39 years at MTSU, he taught General Biology, Embryology, Comparative Anatomy, Ecology, Radiation Biology, and General Physiology. He contributed to the Graduate Committee, the Social Committee, and the Pre-Professional Advisory Committee. He was an advisor for medical technology students, biology majors, and Beta Beta Beta Biological Honor

Society. He directed student research for six master's thesis students and for numerous graduate student term papers (pre-thesis days).

Wymer was a major influence in helping to design what became the physiology area of Davis Science Building. (The Wiser-Patten Science Building was named in part for his late brother J. Elrod Wiser). In its 2007 issue, BioUpdate highlighted many of the retired and other former faculty of the Biology Department. In his statement, Wymer recalled his best memories of MTSU being those of students. He most enjoyed seeing students develop and grow during their time at MTSU and then moving on to professional schools and into careers. Many of his former students have returned to MTSU to serve as faculty. This list includes former faculty Gerald Parchment, Ralph Sharp, Patrick Doyle, Eugene Strobel, and Jim Kemp. Current professors Bob McGhee, Sarah Barlow, Padgett Kelly, Gore Ervin, and Kim Sadler were all former students of Dr. Wiser. Other former students include several science and math teachers in Rutherford County schools and elsewhere, including several at colleges and universities throughout Tennessee and the U.S. He mentored a brother and a nephew, who, along with many other students, went on to become physicians and dentists, many practicing here in Murfreesboro.

Dr. Wiser left a lasting impression at MTSU and throughout the middle Tennessee community. He showed us how to be an exemplary professor, husband, father, community leader, and most of all, a good friend. Dr. Wiser will be missed by both his personal family and his MTSU family.

Scholars Week

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Alicja Kutyla and Judith Shardo

(faculty) presented "The Sacral Auricular Surface and Its Significance in Estimating Age from Human Skeletal Remains."



Timothy Worrall, Frank Bailey (faculty), and Vince Cobb (faculty) presented "Variation of Mercury and Organochlorine Contamination in Cottonmouths (*Agkistrodon piscivorus*)."

Julie Phillips and Matthew Klukowski (faculty) presented "Influence of Season and Adrenocorticotrophic Hormone on Corticosterone in Female Fence Lizards."

Laura Wanamaker and Amy Jetton (faculty) presented "Effect of Angiotensin II on Mouse Vascular Smooth Muscle Cells."

Karen Metius-House and Kim Sadler (faculty) presented "Rocking Out in



Glades: The Impact of Field Ecology Experiences on Elementary Student Knowledge and Attitudes."

Michelle Drury and John Zamora (faculty) presented "Isolation and Identification of Toluene-Degrading Microorganisms."



Leigh Gostowski and Kim Sadler (faculty) presented "Club Neutron: An Out-of-School STEM Experience for Middle School Students."

Emily Vest, **Nick Saïtes** (undergraduate student), Michael Thompson (faculty), and Rebecca Seipelt (faculty) presented "Involvement of Arginyl Aminopeptidase B-Like 1 Codon 144 in Chloride Sensitivity."

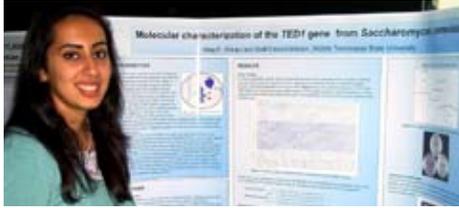
Lacy Danikas and Vince Cobb (faculty) presented "Spatial Ecology of the Banded Watersnake."

Collin Jaeger and Vince Cobb (faculty) presented "Spatial Ecology of the Painted Turtle (*Chrysemys picta*) and Red-Eared Slider (*Trachemys scripta*)."



Scholars Week *continued from p. 4*

Nida Shirazi and Matthew Elrod-Erickson (faculty) presented "Molecular Characterization of the *ted1* Gene from *Saccharomyces cerevisiae*."



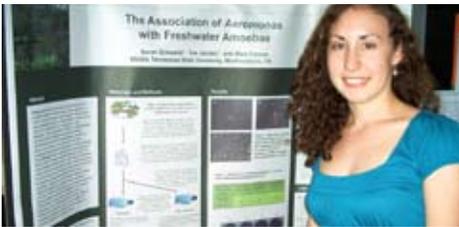
Daniel Levic and Matthew Elrod-Erickson (faculty) presented "Preliminary Characterization of the *ylr65c* Gene in *Saccharomyces cerevisiae*."

Adam Pflum and Jerry Reagan (faculty) presented "Cholesterol-Induced Regulation of Acid Sphingomyelinase."

Sataree Khuansuwan and Mary Farone (faculty) presented "The Isolation of Amoebae-Resistant Bacteria from Creeks."

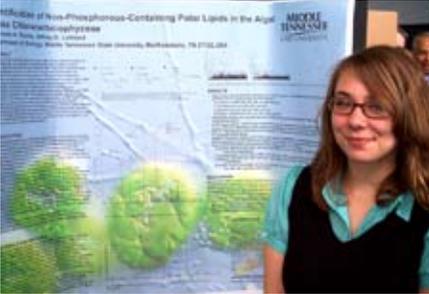


Sarah Schwartz, Timothy Jacobs, and Mary Farone (faculty) presented "The Association of *Aeromonas* with Freshwater Amoebae."



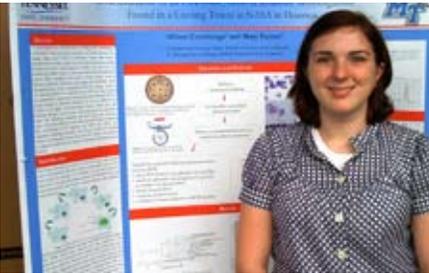
Megan Imboden and William Stewart (faculty) presented "Cross-Talk Between the Ceramide Producing Pathway and the JAK/STAT Pathway in Neuro-2A Cells."

Shannon Roche and Jeff Leblond (faculty) presented "Characterization of Glycolipids and Non-Phosphorus-Containing Polar Lipids in Chlorarachniophytes (*Chlorarachniophyceae*)."



Courtney Thompson and Michael Thompson (faculty) presented "Tryptophan³⁵⁶ and Asparagine³⁶² Are Essential for the Peptidase Reaction of Leukotriene A4 Hydrolase."

Allison Cummings and Mary Farone (faculty) presented "Characterization of an Unknown Legionella-Like Amoebal Pathogen from a Cooling Tower at NASA."



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Alumni Making Their Mark

Emily Hendrix Dearden (B.S. '07) is working in the research and development lab at Vi-Jon (formerly Cumberland Swan).

Linette Rivera-Hubbell (B.S. '08) began an M.D. program in July 2008. She is attending Ponce School of Medicine in Puerto Rico.

Julie Phillips (M.S. '06) is about 18 months into her Ph.D. program at the University of California-Merced. She wants to learn how elephant seal pups manage their considerable sleep apnea without the cardiovascular effects that similar apnea creates in humans. The pups sometimes stop breathing for 9 to 10 minutes as they sleep. When humans have apnea that severe, they are at high risk of dying from cardiovascular damage. The seals' endocrine systems may offer humans knowledge about how to sever that connection. Phillips has been visiting the elephant seal pups at Año Nuevo State Natural Reserve, 55 miles south of San Francisco, learning how to collect plasma samples to study their endocrine system during the early and late phases of fasting, an annual component of their life history.

UC-Merced is working out well for Phillips and her husband, who is a Ph.D. student in computer science and engineering. They started a Capoeira class (Afro-Brazilian martial arts and dance) a year ago at the Merced Multicultural Arts Center.

Jessica Hogan (M.S. '00) is an assistant professor at Central Virginia Community College in Lynchburg. She has been teaching general biology, anatomy and physiology, and microbiology.



Beta Beta Beta, Kappa Delta Chapter

Officers for 2008-2009

Rachel Lester, president
Shannon Roche, vice president
Katie Reagan, secretary
Rebecca Houser, treasurer
Virginia Schlitt, historian

The Kappa Delta Chapter of Beta Beta Beta Biological Honor Society here at Middle Tennessee State University held a faculty bake-off and lab jacket auction during the fall semester of 2008. Students and faculty voted on the best baked item while they enjoyed mouth-watering goodies. Bids were placed on the faculty member of choice to wear a really well-decorated lab coat.

The winner of the bake-off was Dr. Herlihy, and the lucky faculty member chosen (by a landslide) to wear the lab coat was Dr. R. Stephen Howard. He was a good sport to participate in the auction and to wear the lab coat to class after his "victory."

The fundraiser was a great success for the club, and the support of the faculty members was amazing. Without the great support of the faculty and students, none of this could have happened. The chapter thanks all who participated.



Dr. R. Stephen Howard, winner of the Beta Beta Beta extreme lab coat auction.

In this issue of BioUpdate we highlight seven students on internships. Most of the following narrative is directly from the students themselves. Three of these students arranged their own internships, and the other four took advantage of internships that have already been established through MTSU. Five of the seven received pay as part of their internship and four received University credit. Kayla Payne not only arranged her own internship at the Sarah Cannon Research Institute but also her experience has initiated the internship program there. In addition, Kayla is now employed at SCRI and is training other interns. Way to go, Kayla!

Leonella Carriedo



**Carnegie
Institution of
Washington
Department of
Plant Biology
Stanford University
Stanford, California**

I participated in an internship at the Carnegie Institution of Washington, Department of Plant Biology, located on the campus of Stanford University during the summer of 2008. While there, I worked alongside high-profile researchers investigating the cell polarity in the leaves of *Arabidopsis thaliana*, a common model organism. Understanding this aspect of plant growth is important since leaves are one of the most vital organs of a plant. Ill-formed leaves can be fatal considering that photosynthesis alone is one of the critical biological processes.

A previous study that prompted this investigation revealed that there are other small families of genes which help regulate the five primary genes known to control the polarity of cells in leaves. Therefore, we were interested in finding their relationship with these primary genes and how strongly they acted as regulators of leaf polarity. I was responsible for creating mutations in the DNA of *Arabidopsis* that would create physically recognizable defects in leaf structure that would test for loss of function. After many weeks of trial and error, I was successful in creating the desired mutant strands of DNA.

The work itself was not difficult, as I found myself well-prepared with my

brief introduction to biotechnology here at MTSU in Dr. Cahoon's lab. Prior to entering the lab at Carnegie, I was afraid that I would not be well received by all of the scientists. I was pleasantly surprised at the wonderful learning environment facilitated by everyone. I was one of four interns; two were from Stanford, and one was from Berkeley. I was the only out-of-state intern in the lab. I received a lot of guidance and advice from the postdoctoral fellows regarding additional training and graduate schools. I left Carnegie with a greater sense of what I want to accomplish and [my] course of study as a graduate student. By the end of the summer, I felt a greater level of confidence and was proud to finally acknowledge my emergence as a young scientist.

Nicholas Chamberlain



**Orchid Cellmark
Antioch, Tennessee**

I had multiple responsibilities while interning at Orchid Cellmark. The main responsibility that I had was to update all their hard copy Material and Safety Data Sheets (MSDS) and then to create PDF files for all the updated MSDS files. Doing this enables scientists in the laboratories to electronically access the MSDS files that they need. The next responsibility that I had was to shadow CODIS and casework scientists performing all the laboratory procedures. I first read the safety operating procedures for the processes I would be observing and then witnessed and asked questions about the procedures as they were performed. I did this for all the basic procedures from the initial cutting of the sample to the final analysis of the extracted DNA. My last responsibility was to set up and test a prevalidation procedure for acid phosphatase mapping, which is a presumptive test used by casework scientists for the presence and location of seminal fluids on the items being tested.

This internship was a great opportunity for me to learn about a career in DNA forensics testing. It gave insight to the flexible hours of the job and relaxed dress

code and also enabled me to see the great amount of travel this job entails due to the responsibility to report findings in courts across the nation. The work environment also appears to be very upbeat, and everyone was very easy to talk to about questions or concerns. An example of this was when they had their Halloween costume party and judged the best costume. One of the most morally satisfying parts of the job is that you are aiding in catching people who committed horrific crimes, and this is the reason why many of the scientists chose this as their career. The internship showed me negative aspects of the job as well. Some of the procedures can become repetitive and rather dull over long periods of time, and there is a low base salary in the field. By having the chance to shadow the scientists I was able to see exactly what they did in the laboratory and all the quality control that was implemented to try to prevent contamination of the samples. The MSDS project allowed me to become familiar with the chemicals and discover the location and requirements for storage of the chemicals in the laboratory. The prevalidation project gave me insight as to how the field is always trying to improve on its testing procedures for economical reasons, to improve time of experiments, to obtain more accurate readings, to reduce contamination, and to improve collection of DNA. This internship enabled me to discover that this field of work probably is not what I would want my career choice to be. However, it did teach me how a laboratory works as a business and made me realize all that goes into making a laboratory function smoothly.

Kayla Payne



**Sarah Cannon
Research Institute
Nashville,
Tennessee**

Participation in the Sarah Cannon Research Institute (SCRI) Internship Oncology Research Consortium program provided me with insights on what might be expected from a career in oncology clinical research. It changed my image of how a community-based

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Internships continued from p. 6

research program operates and helped me to understand the contributions that are being made to cancer research and the impacts on individuals throughout the country.

The summer 2008 internship program was designed to complete a training manual, which included working practice guidelines for the Oncology Consortium Department. This internship was my first experience in a clinical trial work environment. I imagined that I would serve as an assistant to a clinical research specialist. Instead, I was responsible for creating a training manual and assigned other various tasks. A few of the assigned tasks were queried clinical trials, enrolling study participants, scheduling site initiation visits, and attending available educational courses. I completed each task independently, while my mentor, clinical research specialist Cassie Lane, provided support and guidance via daily contact and frequent critiques. Given the freedom to work independently on the training manual gave me a greater sense of personal responsibility for the work that I produced. I enjoyed working with the consortium team to learn each process involved in clinical trials.

I feel very fortunate to have had the opportunity to be an intern at SCRI. My experience with SCRI was invaluable. I learned many tasks and processes throughout the summer, and I am very proud of my accomplishments. As a clinical research specialist intern, I feel very fortunate to have had an outstanding mentor who put aside many hours to train me in detail throughout the summer.

Shannon Roche



Environ
Brentwood,
Tennessee

The University-sponsored program STEP^{IN} exposed me to the possibility of being a paid intern over the summer. I was accepted as an eco-toxicology intern at Environ, which does commercial effluent testing from sites across the nation. I was responsible for care of the indicator species used; water parameters

such as hardness, dissolved oxygen, and total residual chlorine content; and loading and checking test conditions. Also for STEP^{IN}, I worked on dietary supplementation with inorganic phosphorous and fatty acid emulsion for the water flea *Ceriodaphnia dubia*. I feel this experience has been beneficial in deciding a future career as well as exposing me to the environment of a commercial laboratory. The company was very excited to have a college student aboard their team and expressed interest in hiring future MTSU students. I would encourage anyone interested in toxicology or environmental science to apply.

Carrie Romer



Vi-Jon
Smyrna, Tennessee

When I was an undergraduate student, I interned at the Vanderbilt University Genetic Counseling Center in the spring of 2004. I really enjoyed that experience (the four credit hours were nice too) but decided genetic counseling was not my career path. Now, as a graduate student, I've taken an interest in laboratory work. So I talked with Dr. Seipelt and asked if I could intern in a laboratory setting to get four hours of credit. That is how the door opened for me to work in the microbiology lab at Vi-Jon. My responsibilities included testing water sites in the factory for bacteria, making media, measuring the pH level of media, sampling air sites for bacteria/mold, labeling plates for experiments, performing growth promotion treatments on media, filling tubes with saline, setting up items for the autoclave, pouring agar plates, and filling out appropriate paperwork. My impressions of the internship were that (1) laboratory work can be enjoyable if everyone works as a team, and (2) that microbiologists have certain procedures that must be followed (i.e., always making sure to disinfect hands often so as not to contaminate samples).

There have been a few memorable experiences. I have really enjoyed walking through the factory area. It reminds me of the show *How It's Made* in that there are

cleverly engineered machines with employees working hard to ensure products are assembled properly. I also think it is neat when we test for *Pseudomonas aeruginosa*, because it fluoresces green under a UV light on certain agar. Another experience that has been quite memorable (and aggravating) is the broken hood that we worked under. It would turn itself on and off throughout the day with a shrill pitch to follow. I'm glad it got fixed, but I don't think I'll be forgetting about it anytime soon!

What I've gotten out of the internship is job experience! I've learned that a positive working environment is crucial to making ends meet. Moreover, I've found that everyone makes mistakes (even those that have worked several years), but mistakes can be fixed and forgotten without remorse.

Kyle Williams



National Institute
on Drug Abuse
(NIDA)
National Institutes
of Health
Baltimore,
Maryland

My work at NIDA involved the characterization of a recently discovered protein that has been shown to have neurotrophic effects. The mechanism of action of this protein has not been fully described at this time, and I specifically examined a possible stress response that involves the relocalization of this protein in the model organism that I used. We were able to identify several very interesting effects relating to this protein, and several new research projects have been developed as a result. Advancements in this area may have implications in the treatment of individuals who have Parkinson's disease and individuals who abuse methamphetamine.

This internship did more to show me what "real-world" molecular biology is all about than anything else that I have done as an undergraduate. I was part of a federal lab, and I was expected to adhere to all of the policies and procedures that go along with that. Nearly every person with whom I came into contact was extremely affable and more than willing to tell me absolutely anything about their work or biology in general. This combination of

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Internships continued from p. 7

very serious work and friendly, easy-going people who thoroughly enjoy their work was fun. I had many awesome experiences.

While I had a great time and was able to do many things outside of the lab, I generally worked about 65 hours a week, and those hours do not include time that I spent writing and reading material related to my project. I presented my work at two poster sessions: one at the Biomedical Research Center at Johns Hopkins Bayview, and one at NIH in Bethesda, Maryland. My primary investigator and I are also in the process of composing a manuscript for journal submission. I met many people of diverse backgrounds, and I was able to have discussions with scientists who are leaders in their areas of study. I had the opportunity to do some of my work at the NIH main campus, and just the chance to walk around the largest clinical facility in the world was awe-inspiring. Many of the techniques that I learned and the equipment that I used were at the forefront of biological technology. Few other institutions have these resources at their disposal and fewer still allow students to use them. All of these opportunities served to make this internship extremely helpful regardless of what combination of medicine and research I eventually choose to pursue.

Emily Vest



**Vanderbilt
Mouse Metabolic
Phenotyping
Center
Nashville,
Tennessee**

During my internship I was allowed to participate in many activities. I was taught not only a lot of experimental techniques at the bench but also the basic ways the lab was run. I saw there was a lot more

going on in the lab besides experiments. In addition, I obtained knowledge about the laws and regulations dealing with animals and research. I felt as if this internship would give me an understanding of the flow and hard work that goes behind research projects. I got to participate in studies and sometimes was left on my own to complete tasks. In the beginning, the internship was nonpaid, but after I completed quite a large amount of work, the group felt I should be paid. It was a good feeling to know that I could really help out in the lab.

One fond memory of my internship was learning about how they perform the tedious surgeries on the mice. I thought that I would not be able to learn such a hard technique (since it is performed under a microscope), but they were so patient and really took the time to help me learn. They wanted me to be able to do it! I really felt great when I successfully implanted a catheter into the jugular vein of a mouse and that it really did work for clamp studies.

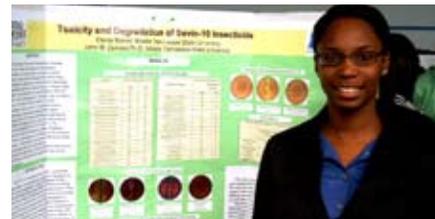
I feel that the internship gives students from the Master of Science in Professional Science (M.S.P.S.) program the chance to really know the type of area in which they want to find employment. It is also a great transition from school to the work force. You get a lot of exposure to a number of positions within the lab. I got to see the management of funds for the lab and did a lot of bench work. Some days I was even going to seminars to listen to other labs' research findings. I was given the opportunity to see how people work together within the lab and how everyone's work affects everyone else.

I feel that the internship is the most important part of the M.S.P.S. program. Courses give you information and a little bit of experience, but the internship puts things in a real-life perspective. Things don't always go "according to the book." Sometimes you have to come up with your own ideas and not be afraid to try things out. 🐭

Scholars Week

continued from p. 5

Eterial Burrell and John Zamora (faculty) presented "Toxicity and Degradation of Sevin-10 Insecticide."



Katherine Barber and Stephen Wright (faculty) presented "Detection and Differentiation of *Borrelia* Species Using a Novel Non-Fluorescence Based Biosensor."



Lyle Williams and Rebecca Seipelt (faculty) presented "Left Ventricular Noncompaction: Genetic Analysis and Case Study."



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

Andrea Martin and Bruce Cahoon (faculty) presented "Sequencing the CP7 Portion of a Fescue Chloroplast Genome."



Ryan Purcell, Jessica Webb, and Bruce Cahoon (faculty) presented "Initial Cloning and Sequence Analysis of the Switchgrass Chloroplast Genome."

Nick Saites, Emily Vest, Michael Thompson (faculty), and Rebecca Seipelt (faculty) presented "Lactoferrin Localization in Normal, Inflamed, and Cancerous Breast Tissue." 🐭



BioUpdate

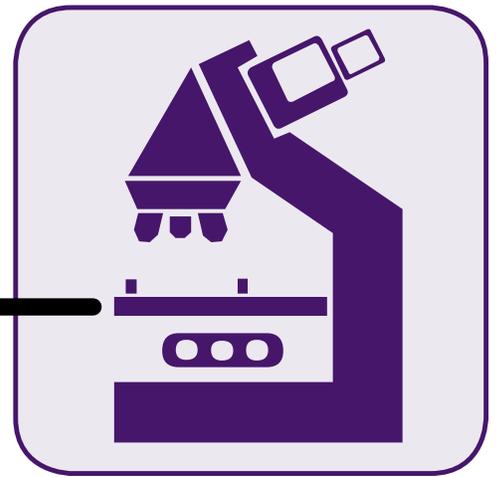
George G. Murphy, department chair
John D. DuBois, editor

Key contributors to this issue of BioUpdate are Cynthia Allen, Virginia McKnight, Kim Cleary Sadler, and John Zamora

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First appearing in the 2008 issue of BioUpdate, *From the Labs* highlights the research programs of the biology faculty. This section brings together the research activities of the faculty, graduate students, and undergraduate students, along with any collaborative projects in which they may be involved. Faculty members submitted information about their current research, recent publications and presentations, recently completed student theses, and news from their current and former students.



“From the Labs”:



from the lab of
**Sarah
Bergemann**

Recent Publications

Bergemann SE, Smith MA, Parrent JL, Gilbert GS, Garbelotto M. 2009. Genetic population structure and distribution of a fungal polypore, *Datronia caperata* (Polyporaceae), in mangrove forests of Central America. *Journal of Biogeography* 36:266–279.

Baumgartner K, Grubisha LC, Fujiyoshi P, Garbelotto M, Bergemann SE. (in press). Microsatellite markers for the diploid Basidiomycete fungus, *Armillaria mellea*. *Molecular Ecology Resources*.

Baumgartner K, Bergemann SE, Fujiyoshi PE, Rolshausen PE, Gubler WD. 2009. Microsatellite markers for the grapevine pathogen, *Eutypa lata*. *Molecular Ecology Resources* 9:222–224.

Recent Presentations

Bergemann SE, Bowman TN, Bruhn J, Baumgartner K. 2008. Interspecific hybridization among multiple phylogenetic species of *Armillaria mellea* in eastern US populations. National meeting of the Mycological Society of America. Pennsylvania State University.



from the lab of
**Andy
Brower**

In the Brower lab, work proceeds on the molecular systematics of butterflies. A recent highlight was a September 2008 trip to Peru to attend an international conference on Andean butterflies, followed by an all-too-short collecting trip to jungle and highland habitats with Prof. Gerardo Lamas, director of the Peruvian National Museum of Natural History in Lima. At the conference, Dr. Brower gave a talk critiquing recent research on hybrid speciation in *Heliconius* butterflies; postdoctoral associate **Josh Ogawa** discussed the lab's latest results on molecular systematics of pronophiline butterflies; and graduate student **Jess Matz** presented a poster outlining her research on the south temperate pronophilines, featuring some of her digitally enhanced images of butterfly morphological characteristics.

Dr. Brower continues his positions as associate editor for *Cladistics*, *Systematics and Biodiversity* and the *Canadian Entomologist*. On the home front, Brower and his wife, Darlene Judd, announced the arrival of two colts (Rio Reloncavi and Florissant) and a filly (Bella Coola), born at Mares' Nest in July 2008 and approved as ISR/Oldenburg NA foals in September. They now have an arena in which to ride and train the youngsters!

Recent Publications

Frentiu FD, Bernard GD, Sison-Mangus MP, Brower AVZ, Briscoe AD. 2007. The role of gene duplication in the evolution of spectral shifts in the long wavelength photopigments of butterflies. *Mol. Biol. Evol.* 24:2016–2028.

Warren AD, Ogawa J, Brower AVZ. 2008. Phylogenetic relationships of subfamilies and circumscription of tribes in the family Hesperidae (Lepidoptera: Hesperioidea). *Cladistics* 24:642–676.

Townzen JS, Brower AVZ, Judd DD (*in press*). Utility of identifying the sources of mosquito bloodmeals using mitochondrial cytochrome oxidase subunit I and cytochrome b sequences. *Med. Vet. Entomol.*

Schuh RT, Brower AVZ. 2009. *Biological Systematics: principles and applications*. 2nd ed. Ithaca: Cornell University Press.

Tree of Life Web pages

Brower AVZ (with various coauthors). 2006–2008. Nymphalidae, Pieridae, Hesperidae, Lycaenidae, Riodinidae (and many included clades) 1,900+ pages; Sept. 2006–present in the Tree of Life project, www.tolweb.org



from the lab of
**Bruce
Cahoon**

The Cahoon laboratory is wrapping up several projects. Graduate student Sheri Mersch graduated in May 2008. Her thesis comprised three manuscripts: two are in preparation for submission to journals and a third is serving as the basis of a provisional patent. Graduate student **Gu Dai** (Greg) graduated in December 2007 and is currently working as a lab technician in a plant pathology lab at University of California–Riverside.

Graduate student **Rick Sharpe** is almost finished with his thesis to dissect gene expression patterns between mesophyll and bundle sheath cells in corn leaves as they develop C4 photosynthetic capability. The methodology he developed, along with McNair Scholar **Sade Dunn**, was published this past year in the journal *Plant Methods*.

The final draft of the Fescue (*Festuca arundinaceum*) chloroplast genome was assembled in July 2008. This marks the culmination of 3½ years of data collection by hundreds of undergraduate genetics students and independent research study students. The genome will be entered into the GenBank database; a manuscript describing the genome is in preparation. A second chloroplast genome, Switchgrass (*Panicum virgatum*), is currently being sequenced. The tools developed for the Fescue project are allowing rapid progress. Dr. Cahoon hopes to have this genome completed by summer 2009.

Recent Publications

Sharpe RM, Dunn SN, Cahoon AB. 2008. A plastome primer set for comprehensive quantitative real time RT-PCR analysis of *Zea mays*: A starter primer set for other Poaceae species. *Plant Methods* 4:14.

Cahoon AB, Takacs EM, Sharpe RM, Stern DB. 2008. Nuclear, chloroplast, and mitochondrial transcript abundance along a Maize leaf developmental gradient. *Plant Molecular Biology* 66:33–46.

Recently Completed Theses

Mersch, Sherri M. 2008. Assessing the migrational impact of *Lolium arundinacium* in association with wild-type and novel varieties of the endophytic symbiont *Neotyphodium coenophialium*. 105p.

Former Students

Gu Dai (Greg) (M.S. '07) is working as a lab technician in a plant pathology lab at University of California–Riverside.



from the lab of
**Vince
Cobb**

Graduate student **Carrie Casteel** is researching the effects of nest emergence timing on the locomotor performance of hatchling turtles. **Lacy Danikas** is gearing up for her second field season of collecting water snakes from middle Tennessee and Lake Erie and testing their thermal physiology. **Diane Massey** is finishing her thesis work on chemoreception in kingsnakes and looking forward to entering a Ph.D. program. **Jerrod Shipman**, a newcomer to the Cobb lab, is starting his research in snake thermoregulation.

The Cobb lab is also active in undergraduate research. **Hailey Burton**, a senior Nursing major, **Carly Nielson**, a junior Biology major and CBAS research award recipient, and **Virginia Schlitt**, a junior Biology major and Honors scholar are all working on various research projects with snakes.

Dr. Cobb continues to serve as Beta Beta Beta faculty sponsor and is in his second year as a panelist to review research proposals for the NSF Graduate Research Fellowship program.

Recent Publications

Cobb VA, Peterson CR. 2008. Thermal ecology of hibernation in a population of Great Basin Rattlesnakes, *Crotalus oreganus lutosus*. In Hayes WK, Beaman KR, Cardwell MD, Bush SP, (eds.). *The biology of rattlesnakes*. Loma Linda (CA): Loma Linda University Press. 291–302.

Bailey FC, Cobb VA, Rainwater TR, Worrall T, Klukowski M. 2009. Adrenocortical effects of human encounters on free-ranging Cottonmouths (*Agkistrodon piscivorus*). *Journal of Herpetology* (in press).

Jenkins CL, Peterson CR, Doering SC, Cobb VA. Microgeographic variation in reproductive characteristics among Great Basin Rattlesnakes (*Crotalus oreganus lutosus*) populations. *Copeia* (in press).

Recent Presentations

Jaeger C, Cobb VA. 2008. Spatial ecology of the Painted Turtle (*Chrysemys picta*) and the Red-eared Slider (*Trachemys scripta*) at Reelfoot Lake, Tennessee. Southwestern Association of Naturalists.

Cobb VA, Bailey F, Rainwater T, Worrall T, Klukowski M. 2008. Adrenocortical effects of human disturbance on free-living Cottonmouths (*Agkistrodon piscivorus*). Southwestern Association of Naturalists.

Massey D, Cobb VA. 2008. Temperature affects prey choice in kingsnakes. Tennessee Herpetological Society.

Cobb VA. 2009. Population structure of two turtle species at Reelfoot Lake. Association of Southeastern Biologists.

Cobb continued . . .

Danikas L, Cobb VA. 2009. Investigations into the thermal physiology of a latitudinally widespread species, *Nerodia sipedon*. Association of Southeastern Biologists.

Massey D, Cobb VA. 2009. Temperature influences prey preference in kingsnakes. Association of Southeastern Biologists.

Former Students

Jake Pruett (B.S. '06) received his M.S. from the University of Texas at Tyler in 2008, with a thesis on the thermal ecology of cottonmouths.

Chad Hanna (M.S. '05) is finishing his Ph.D. from the University of Louisville, with a dissertation on habitat choices of foraging crab spiders.

Collin Jaeger (M.S. '08) is beginning a Ph.D. program at Northern Illinois University, initiating research with Massasauga rattlesnakes.

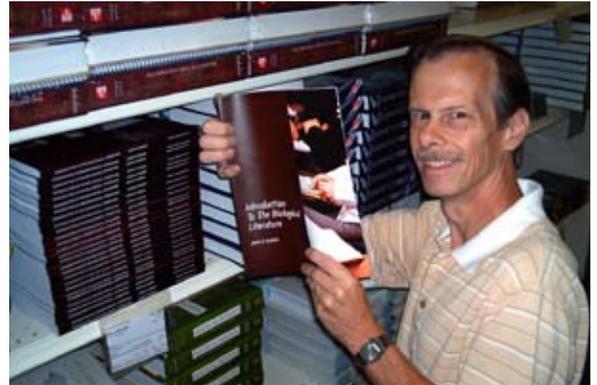


from the lab of
**John
DuBois**

Dr. DuBois continues his statistical consulting within the Biology Department. The most recent project, with undergraduate student **Melissa Shelby**, was investigating the effects of nitrogen fertilizer and Rhizobium inoculation on Kenaf (*Hibiscus cannabinus*), a plant in the Malvaceae family. Melissa completed her research in fall 2008.

For the past nine years, Dr. DuBois has been working on a textbook for the Introduction to Biological Literature course (BIOL 3230). For the fall 2008 semester, the textbook was published commercially by Whittier Publications Inc. of Island Park, N.Y. The textbook project began in the spring of 1999 when DuBois was on sabbatical to visit over 15 university and research libraries throughout the southeastern U.S. Many former students used a locally printed version of the textbook while it was going through reviews and editing.

DuBois began his sixth year in the MentorNet Program, the E-Mentoring Network for Diversity in Engineering and Sciences. This year he is mentoring Kathy Whiteman, a Ph.D. candidate in biological sciences at New Mexico State University.



Dr. DuBois examines a copy of his textbook, *Introduction to the Biological Literature* in Phillips Bookstore.

Recent Presentations

In June 2008, DuBois presented an afternoon workshop, "Selective Breeding Experiments," which detailed the use of the Wisconsin Fast Plant, rapid-cycling *Brassica rapa* to teachers in the Teacher Excellence program at MTSU.



from the lab of
**Matt
Klukowski**

The Klukowski research team has been focusing its efforts on the study of adrenal gland steroid hormones in squamate reptiles. Recent projects have involved the effects of acute temperature change and sex on corticosterone levels in water snakes (*Nerodia sipedon*) and the influence of corticosterone on territorial behavior of male fence lizards (*Sceloporus undulatus*). Graduate student **Andrea Huff** is in the process of writing her thesis on the captive behavior of Giant Anteaters. Andrea is also completing the requirements to become certified to teach science at the secondary level.

Recent Publications

Sykes KL, Klukowski M. 2009. Effects of acute temperature change, confinement, and housing on plasma corticosterone in water snakes, *Nerodia sipedon*. *Journal of Experimental Zoology* (in press).

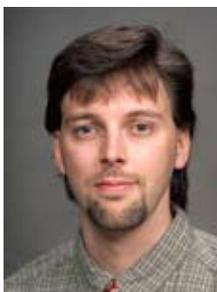
Recently Completed Theses

Sykes, Kyle. 2008. Effects of confinement and temperature on plasma levels of corticosterone in the midland water snake *Nerodia sipedon pleuralis*.

Former Students

Julie Phillips (M.S. '06) is in her second year of a Ph.D. program in biology at the University of California–Merced.

Kyle Sykes (M.S.'08) is teaching biology at Christiana Middle School and still works part-time at Barfield Park's Wilderness Station in Murfreesboro.



from the lab of
**Jeffery
Leblond**

The Leblond lab recently received a grant from the National Science Foundation for \$156K titled "Sterol Biosynthesis in the Marine Dinoflagellate *Karenia brevis*."

Recent Publications

Gray CG, Lasiter AD, Li C, Leblond JD. Mono- and digalactosyldiacylglycerol composition of dino flagellates. I. Peridinin-containing taxa. *Eur. J. Phycology* (in press).

Leblond JD, Lasiter AD. Mono- and digalactosylacylglycerol composition of dinoflagellates. II. *Lepidodinium chlorophorum*, *Karenia brevis* and *Kryptoperidinium foliaceum*, three dinoflagellates with aberrant plastids. *Eur. J. Phycology*. (in press).

Leblond JD, Lasiter AD, Li C, Rengefors K, Logares R, Evens TJ. Applying clustering and phylogeny analysis to study dinoflagellates based on sterol composition. *IEEE BIBM 2008 Bioinformatics Conference in Philadelphia* (in press).

Recently Completed Theses

Gray, Cynthia G. 2008. Mono- and digalactosyldiacylglycerol composition of warm- and cold-adapted Peridinium-containing dinoflagellates. 35p.



from the lab of
**Charles R.
McGhee**

Dr. McGhee continues his work with spider identification and classification. In addition, he is the chair of the Fellows Committee of the Tennessee Academy of Science.

Recent Presentations

McGhee CR. 2008. Review of nomenclature and comments on the genus *Leiobunum* (Arachnida: Phalangida) of North America. Tennessee Academy of Science, Nashville; November 21, 2008.



from the lab of
**Ryan
Otter**

The Otter research team is working on several projects related to applied research in environmental toxicology. The group has focused on three main areas: (1) the eco-toxicological effect of nano-sized particles, (2) the impact of land use and development on the watershed-scale, and (3) the application and formulation of environmentally "green" pervious concrete.

Graduate student **Saffet Guleryuz** is finishing his work on the toxicological effect of aluminum nanoparticles. His work on the effect of these particles on the plant species *Brassica rapa* and *Raphanus sativus* is some of the first work to look at the potential impact of the nanoparticles on plants. Also working on the impact of nanoparticles—in particular, silver nanoparticles—is a new graduate student to the research team, **Chris Bowman**. Chris is beginning to narrow his project focus and will likely concentrate on the antibacterial properties of these novel compounds.

Graduate student **Leslie Sanders** has been designing her thesis project around the impact of land use and development on water quality in the Harpeth River watershed. Her thesis focuses on watershed level impacts and incorporates both field sampling and ecological modeling.

Graduate student **Spring Gilson** has just finished designing her thesis and currently has tests underway to determine the best pervious concrete formulation to remove heavy metals and suspended solids from stormwater runoff. Pervious concrete differs from traditional concrete in that pervious concrete allows water to run through the concrete instead of flowing off as with a traditional concrete formulation. Spring has been working closely with experts in the concrete industry, with the hope that her thesis will have an impact on the choices being made in the concrete industry.

Dr. Otter is a founding member of the MTSU CLEAR (Collaborative Education and Research) Water Institute, which is an interdisciplinary group of scientists from biology, chemistry, economics, education, sociology, and concrete management that addresses social, economic, and environmental issues related to water quality. For more information on the CLEAR Water Institute, visit its Web site: www.mtsu.edu/~clearmt.

Recent Publications

Walters DM, Fritz KM, Otter RR. 2008. The dark side of subsidies: quantifying contaminant exposure to riparian predators via stream insects. *Ecological Applications* (in press).

Offer continued . . .

Drevnick PE, Roberts AP, Otter RR, Hammerschmidt CR, Klaper R, Oris JT. 2008. Mercury toxicity in liver of northern pike from Isle Royale National Park. *Comparative Biochemistry and Physiology Part C: Toxicology and Pharmacology* 147:331–338.

Drevnick PE, Canfield DE, Gorski PR, Shinneman ALC, Engstrom DR, Muir DCG, Smith GR, Garrison PJ, Cleckner LB, Hurley JP, Noble RB, Otter RR, Oris JT. 2007. Deposition and cycling of sulfur controls mercury accumulation in Isle Royale fish. *Environmental Science and Technology* 41:7266–7272.

Recent Presentations

Bailey FC, Cook-Shrivers MB, Danikas LN, Casteel CA, Drury M, Guleryuz S, Phillips NC, Neigh AM, Oldenburg SJ, Otter RR. 2008. Assessment of aluminum nanoparticle toxicity to the terrestrial plants *Brassica rapa* and *Raphanus sativus*. Presented at the 29th Annual Meeting of the Society of Environmental Toxicology and Chemistry. Tampa, Fla.

Oris JT, Fleming E, Knoll L, MacMillan M, Otter RR, Overholt E, Vanni M, Williamson C. 2008. Dissolved organic matter and ultraviolet radiation as sentinels of landscape-scale climate change. Presented at the meeting of Lakes and Reservoirs as Sentinels, Integrators, and Regulators of Climate Change. Lake Tahoe, Nev.

Walters D, Fritz K, Raikow DF, Mills M, Otter RR. 2008. $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ track contaminant flux from aquatic to terrestrial food webs. Presented at the 6th International Conference on Applications of Stable Isotope Techniques to Ecological Studies. Honolulu, Hawaii.

Walters DM, Fritz K, Otter RR. 2008. The dark side of subsidies: Quantifying exposure of riparian predators to contaminants via stream insects. Presented at the 56th Annual Meeting of the North American Benthological Society. Salt Lake City, Utah.



Graduate student Saffet Guleryuz conducting an experiment testing the effect of nano-sized aluminum particles on radishes.



from the lab of
Wayne Rosing

Dr. Rosing has been awarded a three-week research fellowship to collect/study slime molds at the Singapore Botanic Garden. The self-proclaimed myxomycetologist was in Singapore during the first three weeks of March 2009 teasing king/spitting cobras, boa constrictors, pythons, and other assorted pit vipers while looking for Myxomycetes in the primary forests (jungle parks) of Singapore.

Recent Publications

Rosing, WC. 2008. Myxomycetes of Long Hunter State Park, Davidson County, Tennessee. *Castanea* 73:210–213.

Recent Presentations

"Introduction to the Myxomycetes of S.E. Asia" to a general audience of some 40–50 people delivered during the Singapore Botanic Garden's regular plant talk series

Dr. Rosing collecting Myxomycetes in the jungle of Singapore.



"An Introduction to the Myxomycetes: Collection, Specimen Preparation, and Classification" to a small invited group of perhaps 10 members of the staff of the Singapore Botanic Garden and National Park Administration



from the lab of
**Michael
Rutledge**

Dr. Rutledge continues his research on aspects of evolutionary biology education. Specifically, his work focuses on the role of student understanding of the nature of science as a method of inquiry on acceptance of evolutionary theory. As a part of his research, Dr. Rutledge developed instrumentation to assess student acceptance of evolutionary theory. The Measure of Acceptance of the Theory of Evolution instrument (MATE) has recently been utilized in studies conducted in New Zealand, Turkey, the Philippines, and Hong Kong, as well as the United States. Dr. Rutledge’s research activities also involve the development and evaluation of student-centered, active-learning materials designed to make biological concepts relevant and meaningful to undergraduates.

Recent Publications

- Rutledge ML. 2008. Effectiveness of elements of a diversified instructional approach in an introductory biology course. *Bioscene: The Journal of College Biology Teaching* 34 (8): 24–29.
- Rutledge ML, Sadler KC. 2007. Reliability of the ‘Measure of Acceptance of the Theory of Evolution’ (MATE) instrument with university students. *The American Biology Teacher* 69 (6): 328–331.
- Rutledge ML. 2005. The nature of science, critical thinking, and relevance-effectiveness of an activity for the introductory biology course. *The American Biology Teacher* 67 (6): 329–333.



from the lab of
**Kim Cleary
Sadler**

Dr. Sadler currently has several graduate students working on research projects related to informal learning environments. **Karen Metius-House** is finishing her comparisons between cedar glade field ecology and traditional class experiences on elementary student knowledge and attitude about the glades. **Leigh Gostowski**, in addition to serving as coordinator for the NSF-funded Academy for Young Scientists Earth, Energy, and Civilization project, is examining the impact of after-school STEM (Club Neutron) experiences with middle school students. **Zena Tenenbaum** is working with the Great Smoky Mountains Institute at Tremont, conducting a longitudinal study to determine the outcome of summer intern research experiences on attitude and career choice.

Undergraduate student **Aaron Burcham** worked with LeAnn Hays, librarian, and sixth graders at Campus School to field-test revised activities as part of the Chinese Yam National Park Service grant. An important component of this project was service learning; sixth grade students participated in an invasive pest plant removal and native planting day. They also prepared and gave multimedia presentations to community organizations on what they learned about planting native plants.

This spring and summer, undergraduate student **Rebecca Houser** is collaborating with Dr. Sadler on a cedar glade mapping project with Stones River National Battlefield and Terri Hogan, park ecologist. Graduate teaching assistants **Morgan Cook-Shivers** and **Laura Eckerd Wanamaker** have been working with Dr. Sadler for the past year on the revision of the Biology 1031 laboratory manual. A few of the changes involve small lab teams engaged in experimental design with planarian regeneration, seed germination, and animal behavior. Another change is the use of D2L, the MTSU online learning program, for submission of student assignments and grade reporting; lab students know their lab grades each week (no more students disillusioned about their grades at the end of the lab course).

The Math Science Partnership Synergy grant project in which Dr. Sadler serves as co-PI, is in the third and final year. More than 140 middle school teachers

have attended a three-week summer institute and bimonthly Saturday classes to improve their science and math teaching. Preliminary analysis shows a positive gain in participating teacher subject matter knowledge and student standardized test scores. Several graduate students served as scientist-mentors (**Morgan Cook, Diane Massey, and David Olsen**) with Dr. Sadler and **Leigh Gostowski** during the NSF Informal Science Summer Camp for middle school students from at-risk schools. The camp theme, Science in Society, was reinforced through interactive field trips and science activities.

Dr. Sadler received the TSTA Higher Education Teacher of the Year Award and was honored at the joint Tennessee Science Teachers Association and Tennessee Academy of Science Meeting. She also received the 2008 College of Basic and Applied Science Presentation Award.

Recent Presentations

- Gostowski L, Sadler K, Gilbert L. 2008. Club Neutron: An out-of-school STEM experience for middle school students. Tennessee Academy of Science Meeting. Nashville, Tenn.
- Metius-House K, Sadler K. 2008. Rocking out with limestone glades: A comparison of field ecology and traditional class experiences on elementary student knowledge and attitude. 93rd Ecological Society of America Annual Meeting. St. Louis, Mo.
- Gostowski L, Sadler K. 2008. Club Neutron: An out-of-school STEM experience for middle school students. Middle Tennessee State University’s Scholars Week.
- Metius-House K, Sadler K. 2008. Rocking out in glades: The impact of field ecology experiences on elementary student knowledge and attitude. Middle Tennessee State University’s Scholars Week.
- Gostowski L, Sadler K, Gilbert L. 2008. Success in middle school: the EEC Project. National Science Teachers Association. Boston, Mass.



from the lab of
Becky Seipelt

This past year held a great many successes for the Seipelt lab including two awards at the MTSU Scholar's Week Research Symposium, two Honors theses defended, one master's thesis defended, a publication, and several successful grant applications. **Kristina Baker** (now Hulsey) and **Kyle Williams** tied for second place in the undergraduate competition for their works titled "Protein-protein interactions between lactoferrin and matrix metalloproteinase-2" and "Left ventricular noncompaction: Genetic analysis and case study," respectively. **Matthew Schmidt** defended his Honors thesis, "Cyclooxygenase-2 activity is enhanced in the presence of calcium," in the spring, and **Kyle Williams** defended his Honors thesis, "Left ventricular noncompaction: case study and genetic analyses" in the fall. **Bhoomi Shah** defended her master's thesis, "Tissue-specific analysis of human leukotriene A4 hydrolase and laeverin alternative mRNA splicing," in spring 2008. Collaborative work with **Dr. Michael Thompson**, **Dr. Anthony Newsome**, and their students yielded a publication describing an interaction between lactoferrin and matrix metalloproteinase-2 (MMP-2). Dr. Seipelt was awarded a Faculty Research Grant for further investigating the physical interaction between MMP-2 and lactoferrin.



from the lab of
Mike Thompson

The Thompson laboratory has been studying the molecular mechanisms of inflammation and, in particular, focusing on three proteins that are involved in various aspects of the process: leukotriene A4 hydrolase (LTA4H), matrix metalloproteinase-2 (MMP-2), and lactoferrin (LTF). Last year, the laboratory published a paper describing an interaction between LTF and a low molecular weight form of MMP-2 lacking a key regulatory domain that appears to modulate its activity. In the past few months, they have discovered and characterized an additional protein-protein interaction between LTF and pro-MMP-2 that regulates pro-MMP-2 activation. This interaction may well provide a significant link between pro-MMP-2 activation and the resolution of the inflammatory process.



from the lab of
Jeffrey Walck

Dr. Walck is still on sabbatical leave from MTSU serving as a research scientist in the School of Plant Biology at the University of Western Australia and Kings Park and Botanic Garden in Perth, Australia. One of the highlights this year was attending the 9th International Conference on Seed Biology held in Olsztyn, Poland, in early July 2008. He presented a talk titled "Effects of climate change on seed dormancy and germination: a review and identification of research issues." Two posters were coauthored by him as well: "Germination responses to karrikinolide, light, and temperature among age cohorts in two species of Myrtaceae" and "Contrasting germination responses to temperature and light among

Kyle Williams, **Kristina Hulsey**, and **Suzanne Hicks** were awarded URSCA grants for studying MMP-2 interactions, left ventricular noncompaction, and alternative splicing in bipolar Genes, respectively. **Nick Saites** and **Asra Gilani** were awarded STEP^{MT} grants for studying alternative splicing in the age-related gene */clk-1/* in */C. elegans/* and the cloning of TIMP-2, respectively. Other members of the lab, including **Karen Beasley**, **Emily Vest**, **John Deason**, **Prashant Singh**, **Saffet Guleryz**, **David "Chase" West**, and **Varuna Mohan**, made significant progress on several other projects including the biochemical and gene expression characterization of a novel human aminopeptidase RNPEPL1, cloning of matrix metalloproteinase-14, cloning of LVNC-associated regions, and alternative splicing in age-related genes in */C. elegans/*. Manuscripts on the RNPEPL1 work and another collaborative project involving Dr. Thompson on yeast leukotriene A4 hydrolase are in preparation and will soon be submitted.

Recently Completed Theses

Shah, Bhoomi. 2008. Tissue-specific analysis of human leukotriene A4 hydrolase and laeverin alternative mRNA splicing.

The lab is examining the domains involved in this interaction using a series of MMP-2 truncation mutants, and will also examine its effect on the pro-MMP-2:TIMP-2:MMP-14 ternary complex through a series of immunoprecipitation studies. Additionally, experiments to examine the activation kinetics of pro-MMP-2 have been planned for later this year.

Studies of the kinetic mechanism of zinc coordination by LTA4H are nearly complete and will be submitted for publication soon. Students who have contributed to these projects in various capacities over the past two years include **Erin Archer**, **Courtney Thompson**, **Alexis Schaible**, and **Karen Beasley** and biology faculty members Drs. **Rebecca Seipelt** and **Frank Bailey**.

three co-occurring species of *Hibbertia* (Dilleniaceae)." A midweek field trip during the meeting was to the Baltic Sea port city of Gdańsk, where WWII started and the Solidarity Movement began. On the way to and from the meeting, the Walcks enjoyed sightseeing in Frankfurt and London.





from the lab of
**John
Zamora**

The Zamora lab continues its investigations on the antimicrobial and allelopathic effects of various chemicals and extracts. **Adam Wright** is studying permethrin, a man-made insecticide, structurally similar to a naturally occurring chemical called pyrethrum. The first part of this study was to determine if permethrin is toxic to microorganisms. After determining toxicity, the second part of this study was to determine which organisms actually were able to degrade permethrin and use it as an energy source. The final part of this study will be to determine which microorganisms can degrade permethrin most efficiently. This will be accomplished by performing five-day bioassays on all degraders and comparing the results using statistical analysis.

Efua Adetona is finishing her thesis research on *Matricaria recutita L.*, or German chamomile as it is commonly called, a member of the aster family. It is often erroneously referred to as Roman chamomile. It is used as a relaxant, a cosmetic additive, and an antipyretic, and it also confers protection against ulcers. The purpose of her study was to see if extracts of this plant had antimicrobial, allelopathic, or antiviral activity. These extracts were inhibitory to some bacteria. It appears that there are allelopathic chemicals in chamomile. The extracts did not lower the number of plaque-forming units per ml thus indicating no antiviral activity.

Nazra Haniff is finishing her thesis research on the antimicrobial and allelopathic properties of *Camellia sinensis*. Many plants possess phytochemicals that are antiviral, anticarcinogenic, allelopathic, and antibacterial. *Camellia sinensis* is the plant from which black tea, white tea, and green tea is made. The difference between green tea, black tea, and white tea is in how the plant is processed. The purpose of her study was to see if extracts of this plant had antimicrobial, allelopathic, or antiviral activity. The green tea, black tea, and white tea were tested at the same time under the same conditions to measure any differences in activity.

David Adams is working with malathion-degrading microorganisms. Malathion is an

organophosphate insecticide. The first part of his study was to determine if malathion is toxic to microorganisms. After determining toxicity, the second part of the study was to determine which organisms actually were able to degrade malathion and use it as an energy source. The final part of his study will be to determine which microorganisms can degrade malathion most efficiently.

Cayce Owens is working with turmeric (*Curcuma longa*). In Ayurvedic medicine, turmeric is thought to have many medicinal properties. In India it is used it as an antiseptic for cuts and burns. The purpose of this study is to see if extracts of this plant have antimicrobial, antiviral, or allelopathic activity.

Clay Kennedy is working with formaldehyde. Formaldehyde in aqueous solutions is used as a disinfectant. The first part of his study is to determine how toxic formaldehyde is to microorganisms. The second part of his study will be to determine if any microbes can degrade formaldehyde. The final part of his project will be to measure levels of formaldehyde in river runoff. Clay presented parts of his research at the 2008 meeting of the Tennessee Academy of Science.

Gina Cullerton works for a food company. In every food process there are particular stages which affect the quality of the final product. Gina is monitoring the levels of different bacteria at a food processing plant in order to improve final quality. She recently presented her research at the 2008 meeting of the Tennessee Academy of Science.

Sana Shaikh is trying to compare isolation of *Salmonella* from chicken using the standard method as well as an alternative method that may be easier to perform.

Josh Newby is looking for cellulose-degrading microorganisms and recently presented his research at the 2008 meeting of the Tennessee Academy of Science.

Nicole Foster is working with yerba santa (*Eriodictyon glutinosum*). In Spanish it means "holy grass." The purpose of her study is to see if extracts of this plant have antimicrobial, antiviral, or allelopathic activity.

Officers for 2008–2009

Kelly Fitzpatrick, president

Megan Hutchinson, vice president

Rebecca Houser, secretary

Jananne Horchi, treasurer

Nicki Luttrell, activities coordinator

John Zamora, faculty advisor

Former club members are keeping active or continuing their studies. **Rick Kurtz** is working at the Walker library. **Rebecca McWhirter** is a research assistant at Vanderbilt University. **Bryan King** is in his second year of medical school at UT–Memphis. **Andrea Overcast** is working for a food microbiology lab. **Bahareh Tahriri** has started the M.S.P.S. program at MTSU. **Jamie Burchill** (Rogers) is teaching biology and microbiology at Troy University. **Eric Yue** is attending pharmacy school at the University of Houston.

Recent Presentations

Bryan King and **John M. Zamora**. 2008. The isolation and identification of 2,4-dichlorophenoxyacetic acid-degrading bacteria. American Society for Microbiology national meeting, Boston.

Eterial Burrell and **John M. Zamora**. 2008. Toxicity and degradation of Sevin-10 insecticide. Tennessee Academy of Science meeting.

Payal L. Gupta, **Mohammed S. Mahmood**, and **John M. Zamora**. 2008. A comparison of the antimicrobial activity of natural and commercial disinfectants. Tennessee Academy of Science meeting.

J. Clay Kennedy and **John M. Zamora**. 2008. Determination of formaldehyde levels in regions of the Murfreesboro, Tennessee, watershed and an investigation into possible formaldehyde-resistance expressed by select microorganisms. Tennessee Academy of Science meeting.

Gina M. Cullerton and **John M. Zamora**. 2008. How to build a better mouse trap: sanitation issues in the food microbiology industry. Tennessee Academy of Science meeting.

Robert J. P. Newby and **John M. Zamora**. 2008. Cellulose-degrading microorganisms. Tennessee Academy of Science meeting.

Nazra Haniff and **John M. Zamora**. 2008. Antimicrobial and allelopathic properties of *Camellia sinensis*. MTSU Scholar's Day symposium (won third place).

Michelle Drury and **John M. Zamora**. 2008. Isolation and identification of toluene-degrading microorganisms. MTSU Scholar's Day symposium.

Eterial Burrell and **John M. Zamora**. 2008. Toxicity and degradation of Sevin-10 insecticide. MTSU Scholar's Day symposium (won first place).

Eterial Burrell and **John M. Zamora**. 2008. Isolation and identification of microbes that degrade Sevin-10 insecticide using biometric analysis. McNair Scholars Poster presentations.

Graduate Teaching Assistants for 2008-2009

For the 2008–2009 academic year, the department is able to provide 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. Six of this year's assistants hold baccalaureate degrees in subjects other than biology (education, biochemistry, chemistry, psychology, and water resources and environmental biology). Diane Massey holds two baccalaureate degrees and Laura Wanamaker double-majored. All have the requisite training in biology to serve as departmental teaching assistants. Without these GTAs, the department would be unable to offer the numerous sections of the nonmajors biology course (BIOL 1030) and the majors freshman courses (BIOL 1110/1120) along with some sophomore and junior level laboratories.

Chris Bowman, B.S. in the College of Education and Behavioral Sciences, MTSU

Morgan B. Cook, B.S.A. in biological science, University of Georgia

Lacy Danikas, B.S. in biology, Francis Marion University

Abby Drumwright, B.S. in biology, MTSU

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

Stacy Fults, B.S. in biology, Martin Methodist College

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

Michael Hann, B.S. in biochemistry, University of California–Santa Barbara

Justin Head, B.S. in biology, MTSU

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

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

John Paul Johnson, B.S. in biology, MTSU

Andrew Lasiter, B.S. in biology, MTSU

Jenny Maloney, B.S. in biology, MTSU

Diane Massey, B.S./B.A. in biology/psychology, Minnesota State University

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

Leslie Sanders, B.S. in biology, Martin Methodist College

Rick Sharpe, B.S. in biology, MTSU

Phillip Singer, B.S. in biology, MTSU

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

Randy Stewart, B.S. in biology, Martin Methodist College

Zena Tenenbaum, B.S. in biology, MTSU

Robert Trim, B.S. in biology, Lipscomb University

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

Aniekanabasi Udoko, B.S. in biology, Cumberland University

Laura Wanamaker, B.S. in biology/chemistry, MTSU

Joshua Youssef, B.S. in chemistry, MTSU

Biology Department Scholarship Winners, 2008

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

Clay M. Chandler Outstanding Freshman Award

Tiffany Bowman
Zachariah Williams

Ralph E. Sharp Outstanding Sophomore Award

Shannon Murphy

Philip M. Mathis Outstanding Junior Award

Megan Hodorowicz
Merranda Holmes

Peter I. Karl Outstanding Senior Award

Megan Imboden

Elliott Dawson/BioVentures Biotechnology Scholarship

Matthew L. Neal

Maria de los Reyes Microbiology Scholarship

Shannon Roche

C. W. Wisner Medical/Allied Health Award

Rebecca N. Johnson

George G. Murphy Research Scholarship

Alicja Kutyla
David Randy Stewart

Stephen M. Wright Research Scholarship

Richard Sharpe

John M. Zamora Graduate Research Scholarship

Diane Massey
Victoria Woodyard

Mary Ann Harrison McClary and Richard E. McClary Scholarship

Kyle Williams
Rebecca Houser

John D. DuBois Scholarship

Cynthia Gray

Sarah F. Barlow Scholarship

Lacy Danikas

Thomas E. Hemmerly Graduate Research Scholarship

Alycia Kutyla
Lacy Danikas

Mary C. Dunn Graduate Scholarship

Kenneth Ulicny

J. L. Fletcher Graduate Scholarship

Lacy Danikas

Charles Holland Biology Club Scholarship

David Landry

J. Gerald Parchment Biological Field Station Scholarship

David Randy Stewart

John A. Patten Scholarship

David Landry

Marion R. Wells Graduate Research Scholarship

Christina Salehzadeh

Dennis Mullen Vertebrate Biology/Aquatic Biology Research Scholarship

David Landry

Eugene F. Strobel Scholarship

Daniel Tillman

William H. Butler Jr. Graduate Research Scholarship

Victoria Woodyard
Lacy Danikas

Brian Miller Graduate Research Scholarship

David Landry
Lacy Danikas

Kurt E. Blum Botany Research Scholarship

Richard Sharpe

Incoming Freshman Scholarships 2008-2009

Mary C. Dunn Freshman Scholarships

Cassie Frye, Blackman High School, Murfreesboro, Tennessee

Wesley Terry, Seymour High School, Seymour, Tennessee

Ellis Rucker Freshman Scholarship

Craig Sanders, Franklin County High School, Winchester, Tennessee



Theses Completed, 2008

The Biology Department was pleased to have 13 graduates with the Master of Science degree in Biology during the 2008 ceremonies. Nationwide, Middle Tennessee State University is a leader in producing master's level graduates. Thesis topics have included research on bacteria, amphibians, reptiles, and mammals. Students investigated morphology, diversity, physiology, molecular genetics, biochemistry and antimicrobial activity. Students, their graduation year, theses titles, and faculty advisors are listed below.

Drury, Michelle R. 2008. Microbiological degradation of toluene: Case study of a toluene contamination site in Liberty Creek, Franklin, Tennessee. (John Zamora, advisor)

Garner, Chris. 2008. Effect of fencing on riparian restoration and stream water quality in an agricultural watershed in Maury County, Tennessee. (Frank Bailey, advisor)

Gray, Cynthia G. 2008. Mono- and digalactosyldiacylglycerol composition of warm- and cold-adapted, peridinin-containing dinoflagellates. (Jeff Leblond, advisor)

Jaeger, Collin P. 2008. Spatial ecology of the Painted Turtle (*Chrysemys picta*) and Red-eared Slider (*Trachemys scripta*) at Reelfoot Lake, Tennessee. (Vince Cobb, advisor)

King, Bryan J. 2008. The isolation and identification of 2,4-dichlorophenoxyacetic acid-degrading bacteria. (John Zamora, advisor)

Kutyla, Alicja K. 2008. The human sacroiliac joint: An investigation of the chronological changes in the sacral auricular surface. (Judith Shardo, advisor)

Mersch, Sheri M. 2008. Assessing the migrational impact of *Lolium arundinacium* in association with wild-type and novel varieties of the endophytic symbi-

ont *Neotyphodium coenophialum*. (Bruce Cahoon, advisor)

Salehzadeh, Iden. 2008. Decontamination assessment of *Bacillus atrophaeus* spores on common surfaces using chlorine dioxide gas and a novel device. (Anthony Newsome, advisor)

Segars, Laura D. 2008. A bacteriological water quality study of areas on Wheeler Lake and Flint Creek. (John Zamora, advisor)

Shah, Bhoomi. 2008. Tissue-specific analysis of human leukotriene A4 hydrolase and laeverin alternative mRNA splicing. (Rebecca Seipelt, advisor)

Sykes, Kyle L. 2008. Effects of confinement and temperature on plasma levels of corticosterone in the Midland Water Snake, *Nerodia sipedon pleuralis* (Colubridae: Natricinae). (Matt Klukowski, advisor)

Trim, Robert. 2008. Detection of *Entamoeba gingivalis* from the oral cavity by specific amplification of 18SrRNA gene. (Anthony Newsome, advisor)

Wright, Joshua A. 2008. The isolation and identification of permethrin-degrading microorganisms. (John Zamora, advisor)

A complete list of all theses completed to date in the Biology Department can be found at www.mtsu.edu/~jddubois/3230/theses.html.

Full-Time Temporaries and Adjuncts Ease Burdens of Growth

With increased enrollment come increased courses. The need for instructors for these additional class sections is met primarily by full-time temporary and adjunct faculty. This academic year, the department has hired seven full-time temporary faculty and two adjunct faculty. Six of the nine temporary/adjunct faculty hold the doctoral degree; the other three hold master's degrees.

These faculty are teaching Human Anatomy and Physiology I and II, Exploring Biology (nonmajors biology), Microbiology, Genetics, Radiation Biology, 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 not only helps fill instructor roles in an ever-increasing number of course sections but also fills in for research faculty who have received grants and/or contracts that include release time. The department is forever grateful for their help.

Full-Time Temporary Faculty

Karen Davenport Atnip, B.A. 1980, MTSU; Ph.D. 1988, University of Tennessee Health Science Center. Teaching Biology 2011 Anatomy and Physiology Labs.

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 and Biology 3021/5021 Comparative Anatomy of Vertebrates Lab.

Mary Penuel-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 and 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.

Students Accepted to Professional Schools, Fall 2008

We're pleased to announce the acceptance of thirteen biology majors into medical programs for fall 2008. 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!

Tasfia Ahmed,
College of Pharmacy,
University of Tennessee

Daniel Cripps,
College of Pharmacy,
University of Tennessee

John Deason,
College of Pharmacy,
Lipscomb University

Greg Everett,
Southern College of Optometry

Linette Hubbell,
College of Medicine,
Ponce School of Medicine (Puerto Rico)

John Jackson,
College of Medicine,
University of Tennessee and
St. Louis University

Sarah McCormick,
College of Medicine,
Ohio State University

Brooke Pendergrass,
College of Chiropractic,
Logan University

Kristy Stanislov,
College of Dentistry,
University of Tennessee

Katelyn Thurow,
College of Physical Therapy,
Elon University

Huan Vo,
College of Pharmacy,
University of Tennessee

Tyler Walker,
College of Medicine,
East Tennessee State University

Keri Wooten,
College of Pharmacy,
University of Tennessee

The Center for Cedar Glade Studies



Middle Tennessee State University

The Center for Cedar Glade Studies (CCGS), established through the efforts of Drs. **Thomas Hemmerly, Kim Cleary Sadler, Cindi Smith-Walters,** and **Jeff Walck**, in cooperation with Congressman Bart Gordon's office and funding from the Environmental Protection Agency, is beginning its the fourth year of operation. The goals of the CCGS are to provide research opportunities on the ecology of glades, increase educator knowledge and skills about glades, act as a clearinghouse to provide information on glades to the public, and create a network of organizations to identify research and outreach needs for glades. A science advisory council meets annually to oversee CCGS operations. 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, NatureServe; John Froeschauer, Tennessee State Parks; Kevin Fitch, science consultant; and MTSU faculty members **Vince Cobb, Tom Hemmerly, Cindi Smith-Walters, Kim Cleary Sadler,** and **Jeff Walck** (currently on sabbatical in Australia).

Last year the Wildflower Pilgrimage at Cedars of Lebanon was renamed to honor Dr. Elsie Quarterman (she celebrated her 98th birthday in November). More than 80 people were in attendance at the Friday evening dedication ceremony, and on Saturday over 150 people attended presentations and hikes. Let's make this year an even bigger turnout. Please mark your calendars for the Elsie Quarterman Cedar Glade Wildflower Festival at Cedars of Lebanon State Park, May 1 and 2.

The weekend will feature evening programs both days and hikes (Drs. **Tom Hemmerly** and **Kurt Blum**) and special programs throughout the day on May 2.

The second Research Roundtable, held at Cedars of Lebanon State Park in April 2008, was attended by 20 representatives from multiple organizations that have research and management interests in cedar glades. The third Research Roundtable is scheduled for May 1, 2009, at Cedars of Lebanon State Park. If you are interested in attending, please contact Kim Sadler (ksadler@mtsu.edu).

The CCGS is collaborating with Walker Library to create a digital archive of significant cedar glade research not available electronically. The first project was Elsie Quarterman's 1949 dissertation, "Plant Communities of Cedar Glades in Middle Tennessee." Future projects are in the planning stage.

There are wonderful resources available for those of you who are interested in teaching about the cedar glades. *The Cedar Glade Educator Activity Guide*, and *Flatrock Glade Plant Guide* and DVD are wonderful sources of information for teaching about limestone cedar glades. Also available if you simply appreciate cedar glades are the "Cedar Glade Endemic Plants" poster, the Cedar Glade pamphlet, and the DVD *A Visit to the Limestone Glades*. For any of these resources, contact Kim Sadler or the Center for Cedar Glade Studies (gladecenter@mtsu.edu). For more information about the Center for Cedar Glade Studies, visit www.mtsu.edu/~gladectr.

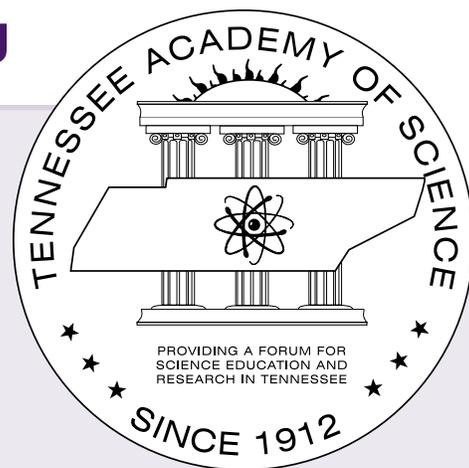
TAS Holds 118th Annual Meeting

The 118th annual meeting of the Tennessee Academy of Science was held November 20–22, 2008, at the Sheraton Music City Hotel in Nashville. The Biology Department presented an unusually low number of student and faculty papers (9) and posters (5) as compared to previous years. However, the department continues its strong support of the academy with a number of faculty members serving as officers, committee chairs, and committee members.

The academy offered two symposia on Friday morning, November 21: "Advances in Teaching Evolution" and "Development of Science Infrastructure in Tennessee." The plenary address was given during the TAS/TSTA

luncheon by Dr. Rick Vanosdall, director of the Tennessee Math, Science, and Technology Education Center at Middle Tennessee State University. His presentation was "Teaching Good Science in Middle School."

MTSU Biology faculty members serving as officers include Cindi Smith-Walters, president, and Gore Ervin, president-elect. Faculty serving as committee chairs during the past year included Kim Sadler, Education Committee, and George Murphy, Necrology Committee. Former graduate students Karen Kendall-Fite and Mandy Carter-Lowe chaired the Membership Committee and Publicity and Research Committee, respectively. Service on committees also included Cindi Smith-Walters (Education and



Nominating Committees), Charles McGhee (Education Committee), and Gore Ervin (Nominating Committee).

The 119th annual meeting of the Tennessee Academy of Science will be October 30, 2009, at the University of Tennessee–Knoxville.

Papers and posters presented at the 2008 meeting are listed below with student authors or coauthors designated with an asterisk.

Papers

A. Bruce Cahoon, Anhua Linn, Chansemone Mysayponh,* Richard M. Sharpe,* Elizabeth J. Thompson,* Andrea D. Ward. "The complete chloroplast genome of Tall Fescue (*Festuca arundinacea*) and the comparison of whole plastomes from the family Poaceae."

Abby M. Drumwright,* Brian W. Allen* and A. Bruce Cahoon. "Survey and DNA barcoding of grass species in flat rock cedar glades and Barrens State Natural Area, Murfreesboro, Tennessee."

Richard M. Sharpe* and A. Bruce Cahoon. "Maize BS and MSC chloroplasts: Same genes, different BS."

Karen A. Beasley,* Michael W. Thompson and Rebecca L. Seipelt. "Arginyl aminopeptidase-like 1 (RNPEPL1) is an alternatively spliced neutral aminopeptidase with specificity for citrulline, methionine, and glutamine residues."

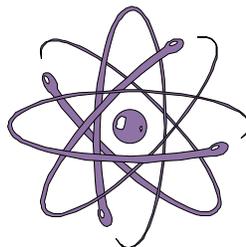
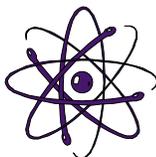
Gina M. Cullerton* and John M. Zamora. "How to build a better mouse trap: Sanitation issues in the food microbiology industry."

J. Clay Kennedy* and John M. Zamora. "Determination of formaldehyde levels in regions of the Murfreesboro, Tennessee, watershed and an investigation into possible formaldehyde-resistance expressed by select microorganisms."

David W. Olsen,* Sharon G. Berk, Anthony L. Farone, and Mary B. Farone. "The characterization of a novel bacterial pathogen isolated from a hot tub."

Robert J. P. Newby* and John M. Zamora. "Cellulose-degrading microorganisms."

Leigh Gostowski, Kim Sadler, and Linda Gilbert. "Storm chasers: The EEC project and the gathering storm."



Posters

Aditya P. Mahajan,* Patrick W. Jennings,* A. Bruce Cahoon, and Jerry W. Reagan. "Effect of cholesterol concentration on lysosomal biogenesis."

Merranda D. Holmes* and Stephen M. Wright. "The production, quantification, and fluorescent detection of anthrax-simulating endospores."

Shannon Murphy*, Ephantus J. Muturi, Chang-Hyun Kim, and Robert J. Norvak. "Predation among *Anopheles gambiae* s.s. and *Culex quinquefasciatus* larvae."

Eterial Burrell* and John Zamora. "Toxicity and degradation of Sevin-10 insecticide."

Payal L. Gupta*, Mohammed S. Mahmood*, and John M. Zamora. "A comparison of the antimicrobial activity of natural and commercial disinfectants."

Jeremy D. Friesen* and Mary B. Farone. "The isolation and virulence characterization of *Staphylococcus aureus* isolates from environmental sources."

CENTER FOR ENVIRONMENTAL EDUCATION

"Water" they up to at the CEE? Efforts to protect water quality...



Last year, 2008, was a full year with the common theme of water running through many of our environmental education efforts. The WaterWorks! program continues to emphasize the important economic, recreation, and health roles of water in our communities and how it is vulnerable to pollution. Helping the public (including homeowners, farmers, developers, students, teachers, community leaders, and others) understand watershed basics and ways to help preserve and improve water quality is a number one goal. This year the CEE has implemented a number of new partnerships to strengthen and unify water protection across the state.

A number of staffing changes have occurred this year. **Cynthia Allen** was promoted to the position of natural resources coordinator and works specifically in CEE outreach to the community and state.

Amanda Sherlin was promoted from administrative assistant to CEE grants coordinator and administers the center's WaterWorks! campaign, which is currently funded by a grant made available by the Tennessee Department of Environment and Conservation's (TDEC) used oil program. This funding allows the development and distribution of an array of educational materials useful to the general public, watershed groups, formal and nonformal teachers, etc., in the fight to reduce nonpoint source pollution.



OUTREACH. WaterWorks! materials range from brochures to DVDs to public service announcements for radio and television and are used statewide by stormwater municipalities, watershed organizations, and other citizen groups. WaterWorks! reinforces a statewide message promoting individual responsibility and often unites groups with similar missions toward the protection of our vulnerable water resources. This broad visibility has brought requests for our materials from beyond our state's borders. Requests have come from as far away as Washington State and most recently from Florida (for ads in theaters).

WaterWorks! efficiently distributes much needed outreach and resource materials to various groups throughout Tennessee's 95 counties. Many are city and county agencies and universities who struggle (or will soon struggle) with budget and personnel issues but nonetheless are required to provide public education under the Clean Water Act.



Locally, the program has partnered with Smyrna's stormwater program to provide outreach and educational materials aimed at reducing nonpoint source pollution. **Padgett Kelly** assisted **Stephanie Davis** and her fifth grade students from Cedar Grove Elementary in Smyrna with their outdoor classroom and annual water quality survey. The water quality reports are to be used as part of Smyrna's stormwater program led by Greg Upham. Cynthia Allen has led fun and interactive presentations for local schoolchildren. She also presented a booth for WaterWorks! at the first Boat Day for the town of Smyrna, held in July 2008 at Stewart Creek Recreational Area.

Padgett Kelly was responsible for even more "wet" outreach. He continues to offer the popular Biome Analysis course in the Florida Keys each summer and sponsors educational trips to local aquariums. A popular program that continues to be sought after is the traveling "whale of a tale" program, which includes a life-size replica of a humpback whale (over 60 feet!).

SUSTAINABILITY. With the rapid increase in growth and development in our region, this year the CEE incorporated LID (Low Impact Development) strategies into its campaign to help encourage sustainable practices. **Cindi Smith-Walters** was invited to deliver "Fostering Environmental Literacy" at the Higher Education and Sustainability Conference recently held at Lipscomb University in Nashville. The conference was part of the Lipscomb Institute for Sustainability's 2008 Tennessee Green Business Summit and Expo. Sustainability is an important topic promoted through the CEE. An example is the value of recycled oil for our economy and the obvious protection it affords the environment. In one year, Tennesseans who change their own oil produce over 1 million gallons of used oil. When properly collected and recycled, used oil is a valuable resource! It takes **42 gallons of crude oil**, but only **1 gallon of used oil** to produce 2½ quarts of new, high-quality lubricating oil. Changes in the global economy reflect why this message is of such importance to our communities.



AWARDS. Last year, the CEE was honored for WaterWorks! outreach efforts with the Governor's Award for Excellence in Green Schools (for higher education).

This year a WaterWorks! proud achievement was winning the coveted Silver Telly award in broadcasting for a video developed for teen drivers, "The Empower Hour—Putting the Brakes on Water Pollution." The video was chosen over several thousand entries. MTSU has received only two other Tellys, both bronze, so it was high praise indeed for our program to receive a silver.

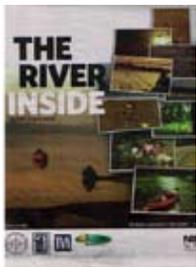
Cynthia Allen, Amanda Sherlin, and partners at TDEC's used oil program worked with the Bill Hudson Advertising Agency to create this award-winning video. The DVD was distributed to high schools, driver training stations, stormwater managers, and local television channels in all 95 counties of Tennessee to educate teens

about ways vehicles contribute to the water pollution problem. Teens are encouraged to maintain vehicles properly and to recycle oil—not only to protect our environment but also to reclaim these oil products for a more efficient use of natural resources. You can view this award-winning video at www.state.tn.us/environment/videos/.



Understanding social factors are important to the CEE mission and program success. **Cindi Smith-Walters** and **Angela Mertig** (Sociology and Anthropology) received a Faculty Research and Creative Activity Committee synergy award for "Social Factors in Changing Water Use in a Rapidly Urbanizing Watershed." This funded proposal led to involvement in the **CLEAR (Collaborative Education and Research) Water Institute**. CLEAR is a group of faculty from Biology, Chemistry, Business, Concrete Industry Management, and Sociology and Anthropology interested in water quality.

PUBLICATIONS and PRESENTATIONS. Encouraging an understanding of our state's unique water resources is important to ensuring their future protection.

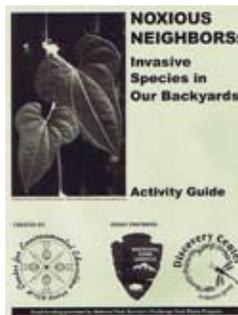


Cindi Smith-Walters was involved in creating an educational 12-page newspaper supplement for the *Tennessean* called "The River Inside." This supplement showcased John Guider's three-month, 1,250 mile canoe trip from his backyard in Williamson County to the mouth of the Mississippi. This excursion was memorialized by the book *The River Inside*

and the accompanying exhibit at the Tennessee State Museum. A summer teacher workshop on the same topic included sessions by **Smith-Walters** and **Karen Hargrove** (former CEE staff member and graduate student, Health and Human Performance) on increasing science literacy through children's trade literature and nature.

Kim Sadler and **Bonnie Ervin** (Discovery Center) authored a chapter in the National Science Teachers Association (NSTA) Exemplary Informal Science programs titled "Splash, Flash, Crank, Slide, Alive! Interactive Standards-based Science Experiences for Pre-K through Second Grade."

Kim Sadler worked with the Discovery Center and **Terri Hogan** (Stones River Battlefield) to implement a grant aimed at eradicating the invasive Chinese yam found on Murfreesboro's greenway system. The project included development of a DVD documenting invasive species removal and the planting of native species. It was incorporated as a supplement to the newly revised 32-page activity guide "Noxious Neighbors: Invasive Species in Our Backyards."



Cindi Smith-Walters and **Karen Hargrove** worked with **Kim Sadler** on the original activity booklet and reviewed final revisions. **Cynthia Allen** coordinated the production of the booklet with

assistance from graduate students **Aaron Burcham** and **Morgan Cook**, **Amanda Sherlin**, and CEE student workers. The guide includes K-12 activities correlated to Tennessee state science standards and is being distributed to stormwater managers, watershed groups, and others who will use the guide as an educational curriculum companion to watershed buffer zone maintenance.

Earlier this year **Cindi Smith-Walters** and **Kim Sadler** were presenters of part of a paper set titled "Projecting EE into Elementary Preservice Programs" at the national conference of the Association for Science Teacher Education (ASTE). MTSU was the only university outside the northwestern United States to share techniques and ideas for incorporating EE into teacher training. The paper set led to the development of a chapter for the proposed ASTE monograph *The Inclusion of Environmental Education in Science Teacher Education*. The chapter that was proposed and later accepted for publication is "Using Environmental Education 'Project' Curricula with Elementary Preservice Teachers." The monograph should be available sometime next year.

The CEE conducts outreach whenever possible. These opportunities allow the center to meet the public, distribute information, and interact with people who may not be committed to or even understand the importance of protecting the environment.

Amanda Sherlin coordinated Earth Day events on campus and at the Murfreesboro Plaza in 2008. **Cynthia Allen** and **Padgett Kelly** represented the CEE at the Shelby Bottoms Water Festival hosted by National Public Television (NPT). Over 600 people participated in interactive, fun events designed to encourage water conservation and water protection. WaterWorks! was also represented at the annual Car Care Night at Greer Stadium in Nashville.



TAMP The Tennessee Amphibian Monitoring Program (TAMP) had another great year in 2008. Through the diligent work of volunteer "frog loggers" across the state, **Bob English** (TAMP coordinator) has been able to add a number of new records to the state database. Sound recordings of species in areas not previously documented caught the attention of our state wildlife agency and the North American Amphibian Monitoring program. Amphibians are important indicators of water quality and an important part of watershed ecosystems. If you would like to learn more about this program or become a volunteer, call Bob at (615) 395-4166. Also for more information, view the center Web site at www.mtsu.edu/~mtsucee and click on TAMP (icon in the lower right corner) for specifics.

All in all, it was a "watershed" year for the environment and for CEE programs and staff. If you want to know more or would like copies of any of the watershed and/or water quality information mentioned here or want to volunteer your time and expertise to make the world a better place through CEE programs (including the statewide TAMP program), you can contact us at (615) 898-2660 or callen@mtsu.edu.

Additional CEE Faculty Highlights

Dr. Cindi Smith-Walters, codirector, was interviewed for a segment of *Tennessee Wildside* concerning the use of the outdoors to teach traditional subject and skill areas. Parts of this interview were also used by the Tennessee Department of Education's Project CENTS (Conservation Education Now for Tennessee Students) DVD on using the out-of-doors to support place-based learning. Smith-Walters also conducted two workshops on the same topic at the first-ever Tennessee Outdoor Classroom Symposium held in April 2008 at Ellington Agricultural Center in Nashville. Currently, she is serving on a task force leadership team to develop a Tennessee Master Naturalist Certification program for the state and on the steering committee for the No Child Left Inside Coalition. This group is seeking ways and funding to encourage the use of the out-of-doors as a classroom and learning environment for both formal and informal learning.

Dr. Padgett Kelly, codirector, won the MTSU 2007-2008 Outstanding Teacher Award. It was the third time that Dr. Kelly had been nominated for this award. His educational efforts were also recognized in the March 2008 article "Tennessee Educator Honored for Population Education Outreach" of Population Connection's *The Reporter*. In addition, Padgett was recently named Distinguished Educator of the Year by the TSTA (Tennessee Science Teachers Association).

Dr. Kim Cleary Sadler recently received the Higher Education Award from the TSTA (Tennessee Science Teachers Association.) Earlier this year, She and **Cindi Smith-Walters** were invited by Gov. Phil Bredesen and Education Commissioner Lana Seivers to be recognized at the State Board of Education meeting for their contributions as committee members to update and revise science curriculum standards in Biology I and II, Anatomy and Physiology, Ecology, and Environmental Science.

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.)

Send contact information and updates to

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