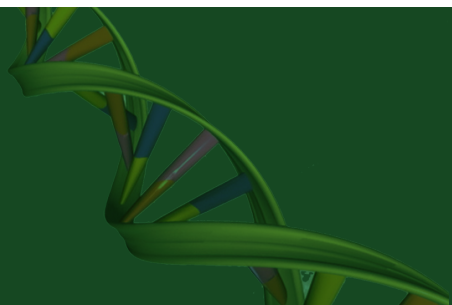


# BioNews

DEPARTMENT OF BIOLOGY NEWSLETTER

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## CHAIR'S CORNER



Dr. Mark Bolyard

Greetings! We have reached the end of Fall Semester and there are still new and exciting things happening in Biology at Union. First, I was busy over the summer, traveling to England and Ireland on a University-Sponsored trip to develop "Study and Serve Abroad" opportunities for Biology majors. I had a chance to visit five universities (in London, Reading, and Dublin) and connect with folks in several ministries to try to lay the groundwork for Union students. Ideally, we would like to be able to provide one competitive scholarship per year as part of this program. If this sounds like something that you would be interested in supporting, please let me know!

In the Spring, we let you know that Dr. McMahan was retiring. Although his retirement has taken effect, he graciously agreed to teach Invertebrate Zoology in the Fall. However, in the Spring, Dr. William (Bill) Thierfelder, who currently works at St. Jude Children's Research Hospital (and formerly at Crichton College), will be joining us. We look forward to having Dr. Thierfelder as part of our team, and we'll introduce him to you more fully in our Spring issue.

Hopefully you received our card indicating that we are still trying to raise the final amount to complete the greenhouse. We have raised the funds to purchase the greenhouse itself, but could still use additional support for the site work and utilities. It's still not too late if you would like to be part of this exciting project!

I also wanted to provide updates on several other initiatives. First, Dr. Kerfoot is doing an excellent job of keeping our saltwater tank up and running. We now have a flat panel monitor mounted above the aquarium which rotates through images that describe what is living inside. We are also making progress on Union's Arboretum ([www.uu.edu/arboretum](http://www.uu.edu/arboretum)) and the meta-arboretum (database of all of the trees in arboreta in the Jackson area). We now have ten labeled trees, and are looking forward to having more trees adopted. Dr. Mike Schiebout is transitioning into the role of Director of the Arboretum, and so we look forward to his work in this regard. If you are interested in adopting a tree, or becoming a Friend of the Arboretum, please visit the website above for more information, or give us a call.

Finally, we have a new Dean of the College of Arts and Sciences (Dr. John Netland, formerly Chair of English), and we are eagerly awaiting the selection of a new President of Union University. We have been so blessed by the leadership of Dr. Dockery, but we are also excited to see who God appoints to fill that office, as well as the other opportunities that Spring will bring!

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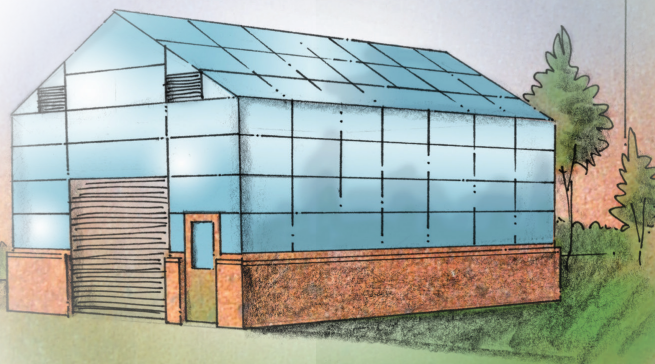
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UNION UNIVERSITY  
DEPARTMENT of BIOLOGY

## FACULTY PROFILE: WAYNE WOFFORD

by Rachel Horton



Dr. Wayne Wofford earned his Bachelor's degree at Union University on the old campus in 1973 before going on to obtain both his Master's degree and PhD at Texas A&M University. He had his PhD less than a week before he was offered a position in research at the University of Texas Marine Science Institute. After six years of working in the research position, two teaching positions opened up at Union. Dr. Wofford told me that Dr. James Huggins was hired exactly three days before him. Dr. Huggins likes to joke with Dr. Wofford that he has three days more tenure than Dr. Wofford. While talking to him, I discovered that Dr. Wofford is currently the only Biology professor at Union who can claim a three generation connection with some of his colleagues. In his undergraduate years at Union, Dr. Wofford was a student of Mrs. Elsie Smith, Union's Microbiology professor. When Dr. Wofford came back to Union to teach, Mrs. Tamara Popplewell, another Biology professor, was his student. Wofford, Smith, and Popplewell once had student-teacher relationships with one another, but now they all currently work as professors in White Hall.

This year marks Dr. Wofford's 27th year teaching at Union University. Pathophysiology, Physiology, Developmental Biology, and Ecotoxicology are among the classes that Dr. Wofford currently teaches. Before Dr. Michael Schiebout joined the Biology Department at Union, Dr. Wofford also taught Botany. When he is not teaching or helping students with research, Dr. Wofford enjoys spending time with his family and developing hobbies such as photography, woodworking, and collecting and restoring antique woodworking tools.

Dr. Wofford's research and scholarship interests include ecotoxicology, the distribution of insects in West Tennessee, and the interaction of science and faith. He is particularly interested in research involving the effects of the introduction of chemicals into the environment, especially the aquatic environment, having focused his dissertation work on the effect of petroleum hydrocarbons on marine animals. It is easy to understand why Dr. Wofford was particularly interested in the BP Oil spill in the Gulf of Mexico in 2010.

Dr. Wofford told me that his favorite part of being a Biology professor was helping and interacting with the students. He said that he loves to get in the lab and help students as they are working on their research projects. Dr. Wofford taught a one semester research class for twenty years, and during that time period he supervised over 250 students. In fact, it was Dr. Wofford who petitioned the Biology department to switch the research class from a one semester track to a three semester track for those students working on individual projects. He found that the students were developing much more complicated research interests and one semester was simply not enough time for the students to complete their projects.

Dr. Wofford admitted that while he was in school he said that he would never teach, but it has been a blessing for the students and faculty of Union that God lead Dr. Wofford into teaching. I have had the privilege of working under Dr. Wofford as a student lab assistant, and he always has a joke or a funny story to share with others. Dr. Wofford has impacted many lives throughout the years, and he plans to continue serving the students of White Hall for years to come. Dr. Wofford exudes a great passion for both his students and teaching, and the Biology Department is fortunate to have such a dedicated professor.



## RESEARCH UPDATE

by Dr. Michael Schiebout



“Now the Lord God had formed out of the ground all the wild animals and all the birds in the sky. He brought them to the man to see what he would name them; and whatever the man called each living creature, that was its name.” (Gen. 2:19, NIV) The process of classification and identification continues to be critically important for us to be good stewards of creation. The task of plant identification is important as it allows us to determine genetic differences that may be utilized in horticulture or agriculture to develop species that are better able to grow in specific environments.

In 2004, previous TN state botanist and Union alumni Claude Bailey identified a population of sand post oak (*Quercus margaretta*) previously unknown to TN. The nearest known population to the one in TN is located about 100 km south in Mississippi. In the fall of 2012, Union undergraduate Chelsea David along with Claude Baily, Dr. Weaver, and Dr. Wofford collected tissue samples from the TN populations with the goal of determining

its particular DNA structure based on genetic markers; a process known as DNA barcoding. Successfully determined DNA sequences can then be catalogued in an international database for future reference. This barcode could be compared to other oak species to determine relationships between species. Unfortunately the post oak samples collected in 2012 did not yield DNA sequences. Chelsea modified her research questions utilizing the same molecular techniques to investigate similarities and differences among species in the Maple Family. Of particular interest were several morphological variations of Red Maple existing across Union’s campus. From the tissue collected, Chelsea obtained DNA sequences from three of the species and analyzed the relationship of these species as part of her senior research project.

Union undergraduate student Hannah Small, working under the mentoring of Dr. Weaver and Dr. Schiebout, is planning

follow-up research related to the previous project. Specifically she plans to revisit

the population of sand post oaks in the spring and collect young tissue samples that have less secondary metabolites accumulated in the tissue compared to late season leaves. In addition she intends to determine DNA sequences of the unsequenced maple species. Questions still to be answered include: How closely related are the sand post oaks found in TN to other oak species in the DNA barcode database? Is our current protocol sensitive enough to differentiate between maple subspecies? And, what is the optimal protocol for obtaining DNA sequences for the species being investigated?

Through this process Hannah will experience the process of science and also develop her research skills in both plant taxonomy and molecular biology. These skills will serve her well as she pursues a future in graduate research in plant molecular biology.

## BIOLOGY STUDY ABROAD TO LAUNCH IN 2014

by Hannah King

A new study abroad program is projected to launch in 2014 for Union’s junior biology majors. Dr. Bolyard conceived the program two years ago when he saw an interest among biology students in such an experience. By choosing from locations in London, Reading, and Dublin, students can take upper-level biology courses that will apply toward their major.

The department plans to offer an annual \$1,000 competitive scholarship help students with this experience.

The idea originated when biology majors Carson Rider and Kayla Hauss went to Costa Rica to study Spanish and parasitology.

As Dr. Bolyard was finalizing the students’ transfer of credit with Victoria Malone, who coordinates Union’s

external study programs, they discussed the possibility of a new biology study abroad program.

“Shortly after that, I did a survey of upper-level biology majors, asking the question ‘Would you be interested in studying abroad?’” Bolyard said.

To his surprise, more than 80 percent responded positively.

The study abroad program includes the educational experience at the chosen university, as well as the opportunity to serve in a local church and tour the surrounding areas. “Dr. Bolyard made an extensive site visit to confirm our location and program choices”, Malone said.

More than a study abroad program, Bolyard emphasized that it integrates service into the experience.

“President Dockery has talked about Lottie Moon and the importance of being kingdom-oriented,” Bolyard said. “It solidified for me that it’s important for students not just to go overseas and take a biology course that they could get here and then come home. There should be some kingdom-oriented element to it, and that’s where the service component comes into it.”



## AQUARIUM MONITOR

by Mary Kathryn Williams

A new addition to the interior of White Hall is a flat panel monitor above the salt water aquarium. It features a continuous slide show of the various fish and invertebrates present in the tank, containing a picture, the scientific name, and the common name of the organism.

The monitor’s slide show will eventually be upgraded to include other animals that are on the first floor and possibly information on their biology and ecology.

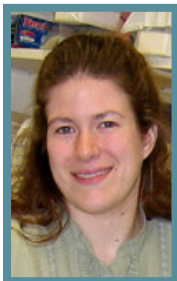
The installation of the monitor was a dual effort by Dr. Mark Bolyard and Dr. James Kerfoot. Instead of answering recurring questions about the aquarium they decided that an updateable monitor would be a positive way to show students, other professors, and any visitors exactly what they are looking at.

Dr. Kerfoot is excited about the monitor and commented that many students have already expressed that they enjoy seeing the information on the monitor and then locating the specific organism in the tank.



## ALUMNI PROFILE: KERSTIN URE

by Jenna Ward



Dr. Kerstin Ure attended Union from 2001-2004. After graduating from Union, Kerstin went on to earn her PhD at the University of Texas Southwestern in Dallas, TX. Her dissertation project involved looking

at neurogenesis in the hippocampus of mice. In 2010 she moved to Baylor College of Medicine in Houston, TX for her postdoctoral work. She has received many awards both at Union and University of Texas Southwestern for her research done in neuroscience. She also has been featured in many journals, such as in the *Journal of Neuroscience*.

Kerstin is currently working on projects that revolve around a disorder called Rett Syndrome. Rett syndrome is an autism spectrum disorder that affects mainly young girls and is caused by a mutation in the *Mecp2* gene. Working with mice, she is able to examine specific neurons in the brain called GABAergic neurons. These neurons inhibit parts of a signaling system in the brain. She is writing a paper on the findings of *Mecp2* and the effects of its expression in male and female mice.

### Which professor had the biggest impact on your experience at Union? How?

"While all of the Union professors had an impact on me, probably the largest and most long lasting impact was from Dr. Carol Weaver. Keeping in mind my dream of becoming a scientist, she helped me design a course load that best prepared me for a future in basic research. She also

suggested doing summer research at St. Jude and helped me get accepted to their program, which was critical not only to getting into graduate school but to proving to me that research was what I wanted to do and that I was capable of doing it. She was tremendously supportive and contributed a great deal to my development as a scientist and as a person."

### What was the hardest part you had to go through to get to where you are now?

"Truthfully, it's all been hard. Science is not a job, it's a lifestyle. It can be all-encompassing and very lonely life, but when things work or you have a fascinating piece of data, it is exhilarating. The hardest part is getting through months of lab work that seems to be going nowhere for that one moment of epiphany and success."

### Any advice for students doing their undergrad now? What is something you wish you knew when you were doing your undergrad that you know now?

I wish I had realized much earlier that in life and in science, there are often no right answers. There are many, many directions to go, but as long as your life is spent in the service and glory of God, you are in the right place. What worked for one person may not work for you, but in going your own way it is almost inevitable that you will disappoint people. This is not always a bad thing; some people you should disappoint. Keep in mind that mistakes are inevitable, but what is really important is how you respond to them and what you learn from them. Knowing this would have saved me a lot of pain and stress."

## CONSERVATION EASEMENT

by James Tutor

Recently the Tennessee Department of Transportation (TDOT) constructed a bridge near Buena Vista, TN to help with a traffic problem. To do this, TDOT had to destroy a conservation wetland. Tennessee state law requires the restoration of another wetland of equal or greater area. TDOT.com states, "The Tennessee Department of Transportation (TDOT) replaces unavoidable wetland impacts through a process referred to as compensatory mitigation, whereby wetlands that are impacted through permitted activities are replaced by restoration or enhancement of a

wetland site."

To accomplish this, TDOT entered into an easement with local landowners to restore a mitigation wetland on their land. This



easement is being used to accomplish the necessary environmental goals without buying the entire property. However, an easement between two parties requires an unbiased third party overseer. Union University became that third party overseer for this conservation easement.

In this position as third party overseer, Union is allowed to send students out to the mitigation site to do field research. Dr. Madison stated, "Ideally, Union would like to send students out there each year to compare the mitigation site with a nearby bottomland hardwood forest. The goal is to make the two sites as identical as possible." This past year, senior Patrick Clark used this mitigation site for his senior research project. Patrick compared the different plants and birds in the mitigation site to the hardwood bottomland forest. His purpose in doing this was to establish a baseline to see how the two communities change over time. He discovered that bird abundance and diversity was higher in the forested wetland. However, plant abundance and diversity was higher in the mitigation site. He established this baseline data so that over time students can see the changes in the mitigation site. Hopefully, other students will continue Patrick's work and observe the process of TDOT's restoration efforts. This conservation easement is beneficial to all three parties, but it appears Union students are getting the most out of the deal.

## UPDATE ON THE NEW GREENHOUSE

by Mary Kathryn Williams

Anyone who has walked or driven by White Hall recently has noticed the big mound of dirt near the SE corner of the building. That dirt pile represents the beginning of the construction of the greenhouse, which will hopefully be completed during Spring term.

The greenhouse will be 36 feet by 26 feet and will be an excellent addition to Union's campus. Included inside the new building will be research benches, an automatic watering system, lighting system, and a heating/cooling system.



Assistant Professor of Biology Dr. Michael Schiebout reported that "having the greenhouse will enhance the research and lab experiences of Union's students." Classes such as Plant Physiology, Botany, and Plant Taxonomy will certainly benefit from the new facility.

Students, professors, and alumni are very excited about this new addition. It will increase the knowledge and understanding that biology students need to be excellence-driven in their field of study.