

BioNews

DEPARTMENT OF BIOLOGY NEWSLETTER

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CHAIR'S CORNER



Dr. Mark Bolyard

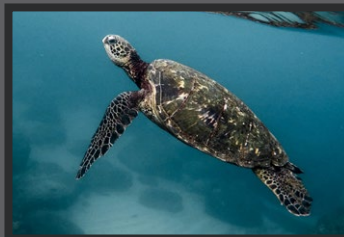
Welcome to our Summer 2017 newsletter, as we have wrapped up another academic year! The Department of Biology continues to be a flurry of activity with new research, off-campus travel, and faces. First, there are a number of new projects underway, as well as projects being wrapped up and published. Dr. Jeremy Blaschke has engaged a number of students in his project which you will read more about in an article in this issue. We also want to congratulate Dr. Blaschke for receiving the first Tri-Beta "Faculty Researcher of the Year" Award. Mrs. Huggins, Dr. Huggins and Dr. Bolyard have partnered with recent Alumna Nar'Asha Randall ('14) and Cara (Nance) Love ('15) to produce a manuscript which was published in April (see article in this issue).

A new academic opportunity was provided to Biology majors and non-majors alike. Following in the footsteps of Dr. McMahan (having offered Tropical Ecology in Belize), Drs. Kerfoot and Schiebout offered Tropical Ecology in Puerto Rico during June 2017 (see article below).

On a bittersweet note for us, we need to let you know that Dr. Jennifer Gruenke has decided to leave Union to pursue other interests (see article in this issue). While we are excited for her future pursuits, we are sad to see her go. After eight years at Union, she has had a huge impact on students who took her classes, did research with her, and just enjoyed chatting with her about the deeper issues of life. We will miss her but wish her well.

TROPICAL ECOLOGY IN PUERTO RICO

Drs. Kerfoot and Schiebout offered Tropical Ecology this June term with 14 days immersed in the vibrant ecosystems of Puerto Rico. This is the first time Tropical Ecology has been offered since Dr. McMahan offered Tropical Ecology in Belize in 2001. The course emphasized ecological concepts related to populations, communities, and ecosystems in the context of a tropical island environment. Specifically, the course focused on coral reefs, mangrove swamps, and tropical rainforests and how these island systems respond to disturbance in a changing environment. During the trip, the class visited Puerto Rico's northwest coast, learning about marine protected areas and other marine habitats. The class then traveled to the south side of the island (Caribbean side), spending time studying mangrove and seagrass communities. Toward the end of the trip they were in the northeast region visiting the only tropical rainforest that is part of the U.S. Forest Service system, El Yunque National Forest. Students had an opportunity to interact with local research scientists Dr. Ariel Lugo, Director of the International Institute of Tropical Forestry, and Dr. Chelsea Harms-Tuohy, Isla Mar Research Expeditions Co-Founder. Other activities included swimming in bioluminescent waters, sampling tropical invertebrate communities, dissecting a lion fish, and spending an extended stay at a research field station within a tropical rainforest. This was an exciting summer as we continue to add new field courses to Union Biology's offerings.



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RESEARCH: ANTIBIOTICS AND WHERE TO FIND THEM

By Jacob Lemon



Welcome to a world where a number of antibiotics are no longer useful because bacteria such as methicillin-resistant *Staphylococcus aureus* (MRSA) and *Mycobacterium tuberculosis* (MTB) strains are becoming more resistant. Therefore, additional antibiotics are being sought to help control and fight against these resistant strains.

Dr. Jeremy Blaschke, Assistant

Professor of Biology, investigated this and recalled a study regarding parasitoid insects producing a natural antibiotic. Parasitoids are insects whose larvae live as parasites that eventually kill their host. Many parasitoid larvae have been found to synthesize a natural antibiotic while living within its host.

For instance, research shows that the emerald cockroach wasp (*Ampulex compressa*) is a parasitoid that stings a cockroach and uses it as the host for the larvae to live in. Since these larvae live within the cockroach's abdomen, it is not a suitable environment as the cockroach decays and dies. Therefore, it was found that the larvae secreted an antibiotic substance that protected them from specific microorganisms while living within the cockroach's abdomen.

From this, Dr. Blaschke and Union University research students performed a similar experiment that dealt with a different parasitoid. They examined the feather footed fly (*Trichopoda pennipes*) and the southern green stink bug (*Nezara viridula*) as the host. Using a similar mechanism to the emerald

cockroach wasp, the feather footed fly acts as a parasitoid by placing its larvae within the stink bug. The goals of the project were to see if the larvae from the feather footed fly would secrete an antibiotic, and, if so, to test it on specific bacteria to see if it inhibited growth.

Dr. Blaschke and his research students compared stink bugs injected with *Escherichia coli* to those not injected with the bacteria. They extracted the hemolymph and secretions to detect if any antibiotics were secreted from the larvae. The disk-diffusion method was used to identify potential antibiotic activity. Filter paper disks were soaked in the secretions and applied to agar plates growing *Staphylococcus epidermidis* and *E. coli*. After 24 hours, there were measurable zones of inhibition around the discs where bacteria did not grow.

Since *S. epidermidis* is gram-positive and *E. coli* is gram-negative, the results showed these secretions inhibited growth for both types of bacterial cells. Therefore, these naturally secreted antibiotics may play a future role in stopping harmful bacteria that we encounter in everyday life.

STAFF PROFILE: FRANCES LANCASTER

By Haley Hathcock

A relatively new face on campus, Mrs. Frances Lancaster serves in both the Biology and Chemistry departments as the Academic Secretary and has been on staff since July of last year.

As a student, she attended Rhodes College in Memphis, where she majored in business and economics and minored in German; after graduating, she was fluent in the language and had the opportunity to study in Germany for a year! Before coming to Union, Mrs. Lancaster worked at Baptist Memorial Healthcare Corporation in Memphis as a software engineer. When her husband, Scott, a Union alum, began serving with Union's Office of University Communications, she and her family moved to Jackson.

In her role as the Biology and Chemistry Academic Secretary at Union, Mrs. Lancaster has played a large part in helping to manage Union's graduate biology program. She also aids in writing, designing, and finalizing the newsletter

each term, and she enjoys being able to use her creativity in creating and designing the departmental posters and flyers seen all over campus. She adds that there is always the task of making sure that there is paper in the copy machine!

She especially loves working in the distinctly Christian environment that Union has to offer, which is a stark contrast to her past experience in the secular workplace, and she says that the academic atmosphere is a refreshing change from her previous work experience. She enjoys interacting with students, as well as being a part of the overall college campus atmosphere. Being able to have lunch with her husband on campus is one of her favorite perks of being at Union, and she is thankful that working part-time allows her to spend more time with family and at home.

In her free time, Mrs. Lancaster enjoys tent camping and being outdoors with her



family. Her husband, Scott, also known as "the man with the video camera", is the Multimedia Producer for the Office of University Communications. They have a daughter who is in the eleventh grade and a son who is in the seventh grade.

FACULTY PROFILE: DR. JENNIFER GRUENKE

By Jonathan Bowman

It is with a sense of sadness for us and excitement for her to announce that Dr. Jennifer Gruenke has decided that she has completed her last academic year at Union. In 2009, Dr. Gruenke noticed an ad for an open position at a Christian institution in Tennessee. At the time, Union University needed a professor to teach Immunology with a PhD in Cell Biology—incidentally, Dr. Gruenke had a PhD in Cell Biology and particularly enjoyed the subject of Immunology. In addition, Union's Biology program stood out to Dr. Gruenke because it had a research component—all Biology majors are required to perform research under a mentor. "Science is finding things out, not just textbooks," thought Dr. Gruenke. Since she hadn't done research since graduate school, the research aspect of Union was appealing. With the open position fitting her qualifications, and the unusual aspect of Union requiring students to perform research, the role seemed like a good fit. She applied for the position, got the interview, drove 14 hours, accepted the job offer, packed up, and moved to Jackson. Dr. Gruenke has been a valuable member of Union University's Department of Biology ever since.

Dr. Gruenke was born in south-central Alaska. When she was 12, her family packed everything up in a station wagon and moved to Murfreesboro, which is located in middle Tennessee. "Growing up in Alaska probably contributed to my love of nature. There's a lot of it up there," reflects Dr. Gruenke. Dr. Gruenke earned her B.S. in Biology at Bryan College, and her PhD in Cell Biology at the University of Virginia. When asked how she identifies herself by practice, she responded with, "I self-identify as a nerd. I like biology a lot, but I wish that the academy were not so segregated by discipline."

Since joining Union's faculty, Dr. Gruenke has enjoyed teaching Immunology Lab and doing research with students. "Union's biology department is unusual in that we have excellent research facilities. Research has been something of a creative outlet for me. I'll come up with a crazy idea and then my student and I try to make it work," says Dr. Gruenke. Some of her most memorable moments occurred while watching students deal with mice in Immunology Lab. Dr. Gruenke informed me: "Once, a mouse freaked out, leapt right onto a student's sweater, and would not let go."

In recent years, Dr. Gruenke has taught Immunology with lab and the two-course A&P sequence for the first-year Pharmacy students. Previously, though, she has taught the A&P I and II lecture and A&P II lab for nursing students, a portion of the Cell lab, the BIO 112 lab, and Immune Response to

Infectious Disease for the second-year Pharmacy students.

Dr. Gruenke loves to learn, so she spends a lot of time reading, whether it be books or online sources. Currently, she is learning French and studying the systems of a house. In addition, she has always been interested in the big questions in life, what Dr. Gruenke calls "Theology and Philosophy," and she looks forward to having more time to read in those fields. In recent years, Dr. Gruenke has gotten into travel hacking, which involves signing up for credit cards to get free flights. So far, Dr. Gruenke has successfully travel-hacked her way to Hawaii, Arizona, and Nice, France. In June, she traveled to Paris with friends. Furthermore, Dr. Gruenke enjoys making, building, and fixing stuff, both in terms of the intellectual challenge of learning how, and the physical challenge of making it happen. Lastly, like many of us, she uses Facebook almost every day, but she does so primarily with the goal of finding and posting things to make people either smile or think. She invites former students to "friend" her if they would like.

All in all, Dr. Gruenke has been a valuable asset to the team of professors in the Department of Biology. She will be dearly missed by the faculty, student body, and—perhaps—the mice. Thank you, Dr. Gruenke, for your time, commitment, and dedication to Union University and to the Biology program.



ALUMNI SPOTLIGHT: BUCKLEY PARKER, P.A.

By Brooke Meadows



Buckley Parker is originally from Jackson, Tennessee and graduated high school at the University School of Jackson. He graduated from Union in 2012 with a major in Biology and a minor

in Chemistry. After graduating from Union, Buckley worked at Jackson Madison County General Hospital in the Emergency Room to gain some first-hand experience in medicine. After working in the emergency room, he decided to go to Bethel University where he completed a Masters in Physician's Assistant studies. While doing his training, Buckley realized his interest in Dermatology and was able to do a rotation at the Jackson Clinic under Dr. Maria Mariencheck. He loves learning about all of the conditions that can be wrong with our skin. He says, "It's our largest organ so why not take care of it!"

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

I was able to spend a summer working with Dr. Madison on the CP33 Habitat Buffer Program. During that time, Dr. Madison helped mentor me and my passion for the outdoors. I am an avid hunter and fisherman so this was right up my alley. I found that classes with Dr. Huggins were not always just classes in biology, but they were often spent redirecting us to our real purpose here in life, to serve Jesus. The way that Dr. Huggins conducts himself in and outside of the classroom is a great model for the students, including myself. He was always quick to tell you how great nature and biology was, but he was very quick to direct us back to the real Creator who was even more important and more spectacular.

What was the most difficult part about getting where you are now?

The most difficult part of getting to where

I am now were the many sleepless nights, mostly during my physician's assistant program. The didactic year of PA school was pushing 27-28 hours per semester and most people say it's like trying to drink from a fire hydrant. I spent many sleepless nights trying to grasp all of the information that was being taught.

What influenced you to choose this career path?

I had always planned to work in the medical profession. Then when I was 13 years old I was diagnosed with a rare form of bone cancer called Ewing's Sarcoma in my left third rib. After a few months of various medical workups and being diagnosed with various conditions, I finally was diagnosed with cancer on July 14, 2004. The next day, I was taken to St. Jude Children's Research Hospital in Memphis, Tennessee. I then spent the next year doing chemotherapy and had various surgeries to remove the tumor and the involved rib. After coming through my battle with cancer, I realized how short life is. I knew then that I wanted to spend my time giving back to patients like those doctors who helped me.

What is your favorite part about your career?

My favorite part about my career path is the mix between assessing and diagnosing conditions from acne to various types of rashes to skin cancers. I also really enjoy the procedural aspect of Dermatology. I never know what my next patient may bring, whether it is a young teenager with acne to an unsuspecting patient who comes in with a melanoma.

Do you have any advice for current undergraduate students?

My advice for students now is to enjoy college and learn all you can, but don't forget the real purpose for our life. Our purpose is not to go to just work or school or various social events, but it is to serve God and always point others towards him WHATEVER we are doing. As long as we are striving for His purpose and will, then we are right where we should be.

STUDENT-FACULTY RESEARCH

By Olivia Dawson

Mrs. Cathy Huggins, Dr. James Huggins, and Dr. Mark Bolyard have recently worked with research students Nar'Asha Randall ('14) and Cara Nance ('15) to conduct a study that led to the recommendation that *Citrobacter freundii* be used as an alternative to *Proteus vulgaris* as the "positive" for hydrogen sulfide production assays.

The reason to evaluate the change is that although *Proteus vulgaris* is widely used in these tests, it has a biosafety level 2 classification, which recommends that these organisms be handled in a biological safety cabinet. Some introductory microbiological laboratories, including ours, are not equipped with these cabinets. For their projects, Nar'Asha and Cara worked with biosafety level 1 alternatives to determine whether they could serve as positive controls for hydrogen sulfide production tests. In many cases, tests for hydrogen sulfide production are conducted after 48 hours, and, because our microbiology laboratories run weekly, Nar'Asha and Cara also wanted to determine whether the test would be valid after one week. These researchers evaluated different media in combination with the use of lead acetate strips, and were able to determine a set of conditions that would work in the introductory microbiology lab.

These results have led to the use of *Citrobacter freundii* and lead acetate strips, along with the appropriate media, in our microbiology laboratory. This is very exciting for the biology department and a manuscript entitled "Identification of an Alternative to *Proteus vulgaris* as a Laboratory Standard for Hydrogen Sulfide Production" has been published in the April 2017 issue of the Journal of Microbiology and Biology Education.



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