



# BIOLOGICAL SCIENCES

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SUMMER 2019 NEWSLETTER

THE UNIVERSITY OF  
**ALABAMA**<sup>®</sup>

# FROM THE CHAIR

This past academic year, 2018-2019, has seen a record number of graduate students joining us. These thirty ambitious and talented students are coming to us from the great state of Alabama as well as the rest of the U.S. and other countries. Our success in recruiting this large cohort of talented students builds on the hard work in the department over the past several years, work that was spearheaded by Dr. Janis O'Donnell during her tenure as the department chair. Janis, a neurogenetics, joined the department in 1989, became a full professor in 1995, and served as department chair from August 2014 until her retirement this past July. Throughout her tenure at UA, she was recognized for her commitment to teaching, research, and service. She initiated a weeklong Biology Bootcamp during the summer for freshmen who desired to come. These students work in small groups and have graduate and undergraduate student mentors. Interspersed with lectures and exams, the Bootcamp teaches students how to study effectively and efficiently, how to develop successful study groups, and how to manage their time. This past August, Janis oversaw the implementation of the second round of Bootcamp, which had nearly twice as many students as the first year. The skills learned in Bootcamp enable students to earn higher grades—in biology and in other courses—and we are committed to continuing and growing the Bootcamp for Biologists. Janis had a stellar 30 year career at UA, and has left an everlasting impact on the department. On behalf of the department, I thank Janis for her dedication and service and wish her happy retirement years.



As the new chair I look forward to working with the amazing group of dedicated faculty and staff. I came to UA in 2008 and established a research group focused on nutrient cycling at the Dauphin Island Sea Lab. Since the Deepwater Horizon oil spill, my group has been collaborating with others on campus and elsewhere to look at the environmental impact of the spill. I am delighted to have relocated to Tuscaloosa. As I continue to work with the faculty and staff to map out and implement a strategy to further increase our research productivity and provide greater opportunities for our students, and be the department's voice in all universities matters, I will keep up my research at the coast.

Our faculty are working on issues that span systematics, population genetics, conservation and management, evolutionary issues at the level of organisms in their environment to the molecular and cellular level, and we work in freshwater and marine systems. We doubled in external funding this past year compared to the prior year, a testament to the strong research clusters we have formed in Botanical Sciences, Computational & Quantitative Biology & Bioinformatics, Ecology, Evolutionary Biology & Conservation Biology, Integrative Organismal Biology, and Molecular & Cellular Biology & Biochemistry. We continue to actively collaborate with colleagues throughout the world. At the last count, our faculty had ongoing collaboration with 115 entities, from state to federal agencies, to non-profits and research institutes to numerous universities in the U.S. and at least 15 other countries. Our undergraduate curriculum continues to emphasize active learning approaches, and we engage nearly 300 undergraduates each year in research in our labs. By offering new courses and research opportunities,

our graduate education curriculum also keeps evolving to prepare our students for productive careers in their chosen fields.

This past year was full of successes and accomplishments. I want to highlight a few. Drs. Staudhammer & Hatoum-Aslan received the President's Award for Faculty Research in the senior and junior faculty categories, respectively, of the Division of Natural Science, Math & Engineering. Dr. Gregory Starr received a Fulbright Research Fellowship for a project entitled "Trading Water for Food" in Lusignan, France. He also was named the Jean d'Alembert Research Chair at the AgroParis Technology Institute from January 1, 2018–December 31, 2019. Dr. Laura Reed was named Director of the Genomics Education Partnership. This program engages approximately 2,000 students per year at 126 different colleges and universities in genomics research, starting with raw DNA sequence data and culminating in research publications. Dr. Kevin Kocot won the American Microscopical Society Buchsbaum Prize for Excellence in Photomicrography. Dr. Asma Hatoum-Aslan received a National Science Foundation CAREER award for her project "Mechanisms of defense and counter-defense in the battle between bacteria and their viruses." Dr. Carol Duffy was named a College of Arts and Sciences Distinguished Teaching Fellow. Jeana Yates's Biology Outreach activities this past year alone engaged over 1,000 students in the local schools. We are also delighted to have Drs. Andy Chaudhuri, Nathan Correll, Kaleb Heinrich, Tyler Hodges, and Jason Pienaar join our department.

If you are exploring the idea of becoming an undergraduate or graduate student, are one of our esteemed alumni, or are interested in what we do, I am confident you will find our newsletter and website informative. We welcome the opportunity to share more about the department. If you are visiting Tuscaloosa, please do reach out to us. We would love to have you visit. If you are interested in exploring opportunities to become involved in the Department of Biological Sciences, give me a call or send me a note at [bmortazavi@ua.edu](mailto:bmortazavi@ua.edu). I would love to hear from you.

## **DR. BEHZAD MORTAZAVI**

Professor and Department Chair  
Department of Biological Sciences

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***To make a gift to the department, visit  
[bsc.ua.edu/make-a-gift](http://bsc.ua.edu/make-a-gift).***

# THE SOCIAL SIDE OF HYDRA

Last summer, Jordan Bolling, a Tuscaloosa native, was exploring the social behavior of hydra, a simple polyp organism that lives in all types of fresh water. At the end of her study, she concluded that they showed rudimentary signs of social behavior, but there was more work to be done. This was capped with a poster entitled “Does Hydra Have Social Behavior”.

This research was performed as a summer student fellowship with the Marine Biological Laboratory in Woods Hole, Mass. This prestigious award provided 10 undergraduates from across the country the opportunity to spend 10 weeks participating in seminars, career-building workshops, and performing research.

Following this research experience, Jordan joined the UA research lab of Dr. Stanislava Chtarbanova in the Department of Biological Sciences. In her lab, Jordan is studying how the *Drosophila* brain responds to infection.

Specifically, she is examining how systemic and brain-specific exposure to bacteria causes activation of immunity and seeks to identify the exact cell types in the brain involved in this activation.

Overall, Jordan feels that her summer experience at the Marine Biological Laboratory was a springboard for her long-term career. The program allowed her to make professional connections with scientists around the U.S.

Jordan Bolling is a junior Biological Sciences major with a Neuroscience minor. Next year, she plans to apply to graduate school for a doctoral degree in neuroscience. ■



## REEFS, RESEARCH AND WEDDING RINGS

International grad students Matteo Monti and Aurora Giorgi took their UA research experience to the next level with a 6-week trip to Roatan, Honduras over the summer of 2018. The pair studied the Mesoamerican Barrier Reef System as part of an ongoing 8-year collaboration between Department of Biological Sciences professor Julie Olson and the CoCo View Resort in Roatan. Through this collaboration they had the opportunity to continue their fieldwork studies on coral reef health and biodiversity and to make a long-term impact

in the area by interacting with locals and recreational divers. As trained dive instructors heavily immersed in research related to coral reefs and biodiversity, Matteo and Aurora are able to effectively communicate conservation-related information to fellow divers. Also, “opening their eyes to the wonders under the water” is a way to educate island locals on the importance of the reefs to their livelihood.

Prior to this experience in Honduras, Matteo and Aurora earned their master’s degrees in Italy doing research on reefs and coral conservation and threats to these ecological (and economic) areas. After that, they worked as marine biologists in the Maldives in the Indian Ocean before working as dive instructors in the Dominican Republic. In the latter position they met a professor who referred them to Dr. Julie Olson at The University of Alabama. This introduction was the beginning to their graduate research careers at UA.

Besides the relationship with their advisor, Dr. Julie Olson, the Biology Department at UA has been supportive and made them feel appreciated. Many approachable and interactive professors have contributed to their success at the university, say Matteo and Aurora.

In addition to coral reef surveys, water quality analysis and marine life observations, their experience also led to a recent article, published in *Coral Reefs*, documenting hydroid association with sea horses. Their time together not only contributed to research with a far-reaching impact, however—at the end of the trip, Matteo asked his longtime girlfriend Aurora to spend their lives together ... and she said yes! Roll Tide!!! ■



# FROM BAD TO GOOD: CAN WASTE WATER HELP STOP STAPH INFECTIONS?

Dr. Asma Hatoum is an Assistant Professor of Biological Sciences at UA. She designed and teaches a new course called Phage Discovery (BSC 411). This past year, she won a prestigious NSF CAREER Award for her combined research and teaching efforts, which included the following lab-based class.

## **Q: What is a phage and why should we care about them?**

Dr. Hatoum: A phage is a virus that specifically infects Bacteria or Archaea. They inject their DNA into the host and hijack its cellular machinery to make many copies of themselves. Many phages end up destroying the host in the process. They are by far the most abundant biological entities on the planet. In fact, it is estimated that there are ten billion times more phage particles on Earth (10<sup>31</sup>) than there are stars in the observable universe (10<sup>21</sup>). Phages outnumber their bacterial or archaeal hosts by a factor of ten in every environment tested. Phages are thus the dominant players in shaping microbial ecosystems, including our own microbiomes. Because of their relative simplicity compared to living cells, phages served as the model organisms that helped launch the field of molecular biology, even being a part of the initial experiments that led to the revelation that DNA (not protein) is the source of heritable information. Of the many reasons to care about phages, perhaps the one most relevant to all of us is the promise of developing phage-based therapies to target and eliminate specific bacterial infections, particularly those that are resistant to multiple antibiotics, such as methicillin resistant *Staphylococcus aureus* (MRSA).

## **Q: How did the BSC 411 phage discovery class come to be?**

Dr. Hatoum: When I initially came to UA, my research was primarily focused on understanding the class of immune systems known as CRISPR-Cas, which bacteria and archaea use to defend themselves

against foreign DNA, including phage DNA. As our research progressed, I naturally became interested in the phages themselves as they coevolve with the CRISPR systems in an evolutionary arms race. My research interests now encompass both sides of the phage-host arms race—the immune system in bacteria and the strategies that phages use to counter them. In the class, we specifically look for phages that infect various strains of *Staphylococcus*. The results become part of my research effort, and students have an opportunity to earn authorship on the publications that come from their work. Thus, it is fair to say that this class is very much an authentic research experience.

## **Q: What do students do in your phage discovery class?**

Dr. Hatoum: As the name suggests, students discover and characterize new phages. We start by collecting samples from a site where we are likely to find phages that specifically infect staphylococci—raw sewage. After bringing the sample back to the lab, the real fun begins. Using a variety of laboratory techniques, we purify the phages, test them to see if they kill pathogenic *Staphylococcus* species, sequence their genomes and obtain electron micrographs. We do all of this, along with the bioinformatics associated with characterizing the sequences, in the 3-credit hour BSC 411 lab course that meets Tuesdays, Wednesdays and Thursdays over the course of a semester. The skills students learn are invaluable for future careers in medical school, graduate school or industry. ■

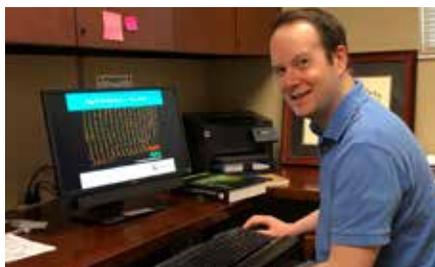
# MEET OUR NEW FACULTY

We are pleased to welcome five new members to our faculty this year. Drs. Andy Chaudhuri, Kaleb Heinrich, Nathan Correll, Jason Pienaar, and Tyler Hodges join the department with a wide range of interests and specialties.



**Dr. Andy Chaudhuri, assistant professor**

“Working with undergrads has been the most rewarding experience so far. Naïve questions asked by students unfettered by dogmas and prejudices sometimes open exciting lines of thought as well as better ways to explain how biology works. I also look forward to opportunities to engage undergraduate students in biomedical research and to provide them a platform to jump-start their career in biomedicine.”



**Dr. Nathan Correll, assistant professor**

“Developing questions and figuring out how to answer them is very rewarding, and the thrill of discovery is addictive. However, research can also be tedious and frustrating. What keeps me going is the idea that my work will help push the field forward and aid in the development of new treatments for heart disease.”



**Dr. Kaleb Heinrich, assistant professor**

“I love being outdoors and playing in water. I especially enjoy getting to interact with students—both undergrad and graduate. When I look at my life, I can think of two periods when I was most impressionable. One was when I was a young child, when my parents played a big role, and the other was when I was on my own for the first time as a freshman in undergrad. I was very fortunate to have great advisors and teachers who continued to inspire and grow my love of biology. I hope that I can be that person for others.”



**Dr. Tyler Hodges, assistant professor**

“In research, I’ve always been most excited by the discovery and using those discoveries in an application. Related to teaching, the most exciting thing is seeing my students do well and succeed at their goals.”



**Dr. Jason Pienaar, assistant professor**

“What excites me most about my area of research is that I get to apply various aspects of my past experiences in South Africa, Florida, Hawaii, Sweden and Oregon to my current research program. Interacting with fantastically creative intellectuals enriches my life beyond measure. It is definitely the collaborative nature of science that excites me most.”

Read the full interviews at [bsc.ua.edu/new-faculty](https://bsc.ua.edu/new-faculty)



## IN MEMORIAM: DR. STEVAN MARCUS

It is with deep regret that our department lost a friend, beloved faculty colleague and mentor to many students, Dr. Stevan Marcus, in January 2018 at the age of 56.

Steve earned his B.S. in Microbiology, as well as his Ph.D. in Cellular, Molecular, and Developmental Biology from the University of Tennessee. A native of the rural East Tennessee, Steve always viewed his time in Knoxville as the formative experience of his lifetime. It was there, in the lab of his treasured doctoral mentor, Dr. Jeff Becker, that he first learned the joy of discovery as an undergraduate and where he blossomed into an outstanding young scientist known for his meticulous writing and lucid presentations. His success at Tennessee positioned him for a fellowship at the prestigious Cold Spring Harbor Laboratory on Long Island, where he was a postdoctoral fellow in the lab of Dr. Michael Wigler, a world-renowned cancer researcher. Steve's groundbreaking research with Dr. Wigler on the prevalent oncogene, Ras, led to an independent faculty appointment at the M.D. Anderson Cancer Center in Houston, where for the next 12 years, he established himself as an international leader in basic research pertaining to cell division, cellular stress response, and cancer.

Despite his successes, Steve felt something was missing in his career, as he genuinely yearned for an opportunity to share his research and mentorship with young people - and the type of students that he was once himself - at a major research university in the South. Thus, it was no accident that he accepted an offer to move to UA in 2006 as a tenured Associate Professor, since this was also where two of his close friends from graduate school, Professors Guy and Kim Caldwell, had established their own academic careers in our department under the leadership of then Chair of Biological Sciences, Dr. Martha Powell. Steve rapidly acclimated to UA and served the Department in a variety of capacities ranging from Chair of the Graduate Committee and teaching Honors Biology for freshmen, to running the Howard Hughes Medical Institute-sponsored undergraduate research program for several summers.

Steve was the recipient of multiple grants from the National Institutes of Health to support his research, as well as other funding from UA, the State of Texas, and private foundations. His research was always considered of the utmost caliber and appeared in the high-profile journals including *Molecular Cell*, *The Journal of Biological Chemistry*, and the *Proceedings of the National Academy of Sciences* (seven times). While at UA, and in collaboration with Dr. Jordan Gutterman of M.D. Anderson, he was granted a patent on a novel therapeutic molecule for cancer treatment. Steve took great pride in preparing students to pursue and attain their professional goals. His former students include numerous recipients of research awards and went on to obtain either their M.D. or Ph.D., as well as faculty positions and/or jobs at Harvard, the University of Pennsylvania, Johns Hopkins, the University of Georgia, UAB, Tulane, Berkeley, Yale, as well as in the pharmaceutical industry.

Outside of the office and lab, Steve was an avid weight-lifter, an excellent amateur photographer, and he enjoyed a wide variety of music and sports; he was especially a big fan of the Boston Celtics and New York Yankees. Steve was also great admirer of the U.S. National Park system, where he and his family routinely vacationed. Most significantly, through a partnership of 29 years with his wife, Karen, he shared in his greatest pride and joy - their brilliant and beautiful boys, Stevan T. and Wesley.

Dr. Stevan Marcus leaves behind a legacy of exceptional professional accomplishment, mentorship, and a well-earned reputation as a rigorous scientist and respected educator. Those who knew him well will always remember that Steve was someone who had a smile for everyone and will miss his fun-loving spirit. He truly had a childlike fascination with living things - the beauty of form and function that exists only in nature - and persists through evolution. An explorer at heart, Steve dedicated his life to discovery - and education of the next generation of explorers.

As a fitting tribute to his legacy, we respectfully ask interested parties to please contribute to the Marcus Memorial Undergraduate Research Fund that has been established in his honor by his family and friends in the UA Department of Biological Sciences. ■



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