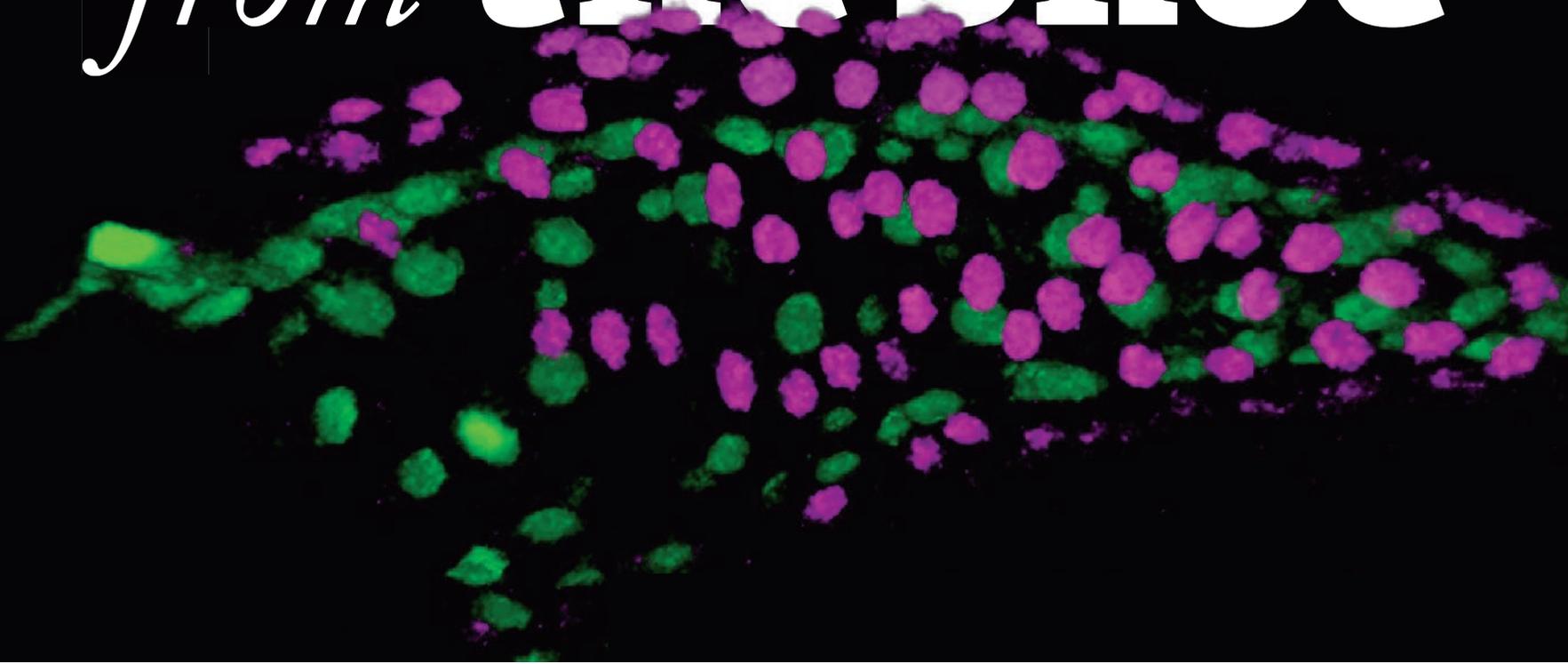


# *from* **the Shoe**





Dear Friends of Biology,

It is with great pleasure that we present our first annual newsletter, *from the Shoe*. The name comes from our home in Shoemaker Hall, a place I trust you remember fondly.

The Department of Biology at the University of Mississippi has been growing, building, changing, and trying to make the world a better place for future generations. Our dynamic department is training and engaging the next generation with high impact educational experiences and research opportunities. Our students are learning field biology in exotic locations, engaging in top tier research, and transforming our world through their efforts.

We present this newsletter to give you a taste of who we are and what we have recently accomplished. We also hope that you accept this newsletter as an invitation to join us in shaping biology at Ole Miss. Send us a note at 214 Shoemaker Hall, P.O. Box 1848, University, MS 38677 or email [biology@olemiss.edu](mailto:biology@olemiss.edu) and let us know what you have been up to or perhaps share some of your favorite memories from your time in our Department. Please stop by the Biology tent, outside Shoemaker Hall, during tailgating to say hi.

We very much look forward to hearing from you.

Hotty Toddy,

Gregg Roman  
PROFESSOR AND CHAIR

## The halls of Shoemaker are inhabited by a number of new faces. In the past few years, three new teaching/research faculty have been added.

Our new chair, Gregg Roman (*pictured on the left*), has joined us from the University of Houston. In addition to his duties as the head of the department, Dr. Roman explores neural and molecular mechanisms of learning and behavior.

Dr. Susan Balenger's research program explores the interaction between host and parasites, with much of her work conducted at the UM Field Station.

Focusing on cellular communication, Dr. Josh Bloomekatz explores the development of cardiac cells, including the development of cardiac disease and regeneration.

Dr. Peter Zee brings an experimental research program that explores biological interactions among species and the influence of these interactions on biological communities.

The past few years have seen the retirement of a number of faculty familiar to those who have walked the halls of Shoemaker over the past three decades. Dr. Paul Lago, Dr. Gary Gaston, Dr. Stephen Threlkeld, Dr. Marge Holland, and Dr. Gail Stratton have hung up their lab coats. 🇺🇸



From left to right, top row, Josh Bloomekatz, Gary Gaston, and Stephen Threlkeld. Middle row, Susan Balenger, Marge Holland, and Gail Stratton. Bottom row, Peter Zee and Paul Lago.

# Hayden Malone

BS BIOLOGY '18



**H**ow did you become a research technologist at St. Jude Children's Research Hospital?

I've always been amazed with St. Jude's mission and research and wanted to work here but I didn't think I'd be a part of it until after graduate school. Last spring Dr. Sarah Liljegren, my honors thesis advisor, shared information about an opening, I applied, and here I am!

I've always wanted to be a researcher, and I've worked on a wide array of projects—bacterial composition of soil, marine biology, host-parasite interactions, plant genetics, plant genomics, and my current study of the epigenomics of cancer.

Tell us about your work at St. Jude and how it may make a difference in fighting cancer.

We're researching a chromatin remodeling complex mutated in over 20% of cancers, including leukemia and rhabdoid tumors. Gaining a functional understanding of how this remodeling complex works can open doors to better targeted therapies, and better outcomes for patients. We are also interested in the role this complex plays in several developmental disorders.

How has this experience helped prepare you for a career in research?

Being a research technologist at St. Jude is incredible. I've learned so much by being involved in groundbreaking research and hearing lectures from Nobel Laureates and other top scientists. While I've enjoyed learning cool research techniques like ChIP-seq and lentiviral transduction of cell culture, the most valuable knowledge I've gained is in how to ask impactful questions and design experiments to answer them.

Do you have any advice for biology majors?

For a career in research, it's important to have a meaningful research experience for job and graduate school applications. Even if you're not in the Honors College, you can complete a capstone research project. Be an active participant in the scientific community; attend scientific talks on campus, and share your research in oral or poster presentations any chance you get.

St. Jude has many opportunities for undergraduates. A Pediatric Oncology Education program offers summer internships in clinical and laboratory-based cancer research, the National

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**... we learned how each phenomenon was discovered by researchers. It made class interesting and taught me how to create experiments to answer important questions.**

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Symposium for Undergraduate Research each summer features student poster presentations and talks, and students can always attend seminars and symposiums. Finally, St. Jude has a Graduate School for Biomedical Sciences. With Oxford so close to Memphis, students should get involved.

What was your favorite class at the University of Mississippi?

Molecular Genetics with Dr. Gregg Roman extensively covered topics only mentioned in basic genetics courses and has been super helpful in my job. Instead of just being told that something works a certain way, we learned how each phenomenon was discovered by researchers. It made class interesting and taught me how to create experiments to answer important questions. 🧪

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Hayden plans to enroll in a PhD program in fall 2020 to further her studies in biology and hopes to continue cancer research.



## Undergraduate Research Profile



Undergraduate Michael Deauville, a member of the microbiology lab research team in Dr. Erik Hom's lab, works to extract a secondary metabolite that has potential to have anti-cancer properties. He is trying to grow a bacterial culture for heterologous expression in the bacterium.

Senior biology major Michael Deauville plans to become a physician, and is pursuing a research project under the direction of Dr. Erik Hom. Michael clicked with Dr. Hom during his Genetics class last fall, and signed up for his experiential learning Study USA course winter intersession on microbes in California, Michael's home state.

For the first time, Michael conducted field research and worked with microbes that play important roles in our ecosystem. He met with world-renowned researchers and physicians to discuss groundbreaking research in infectious disease and cancer biology and industry. These meetings inspired Michael to pursue undergraduate research with Dr. Hom on an ongoing project involving a marine cyanobacterium that produces a potent natural product with anti-tumor and anti-malarial activity.

Last summer, Michael travelled to Cusco, Peru with the Ole Miss Med Life team to promote medical education and development in rural communities. In Peru the student team mobilized mobile medical clinics and provided care to 500+ children and adults during their week-long stay. 🇵🇪

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*Michael was a leader in the peer-tutoring Supplemental Instruction program hosted by UM's Center for Excellence in Teaching and Learning for Genetics. A member of the Kappa Alpha Order, he plans to pursue a master's in public health before attending medical school.*



## TriBeta

Ole Miss TriBeta National Biological Honor Society members recently undertook a long-overdue project. Many alumni will remember lab periods spent exploring the diversity of trees outside Shoemaker and in the Grove/Circle. Members of TriBeta (with Landscape Services) have labeled the trees of the Circle, with plans to label the trees of the Grove.

When you are next on campus, look for their handiwork on the trunks of your favorite shade tree.

TriBeta also participated in the annual Earth Day Clean-Up event at the Ole Miss Whirlpool Trails. Members gathered to pick up trash from the trails and the surrounding area to fill a trailer full of garbage. TriBeta is making this an annual Earth Day event. 🌱



## Study Abroad

*Over the past three years Dr. Brice Noonan has led six groups of students in exploring the biology of islands in the Caribbean.*

Dr. Noonan has regularly led courses to the Caribbean in both the Summer and Wintersession semesters over the past decade. For the past two summers, groups of UM students have spent 2 weeks exploring the forests and reefs of the island of Roatán. In the Wintersession, classes visit seven different islands by ship. By visiting

a variety of islands, students observe the influence of island size, age, and structure on biotic communities. They hike the rainforest-covered mountains of St. Kitts and trek across the grasslands of St. Maarten, gaining an appreciation for the uniquely biodiverse islands of the world and the endangered species inhabiting them. 🌍

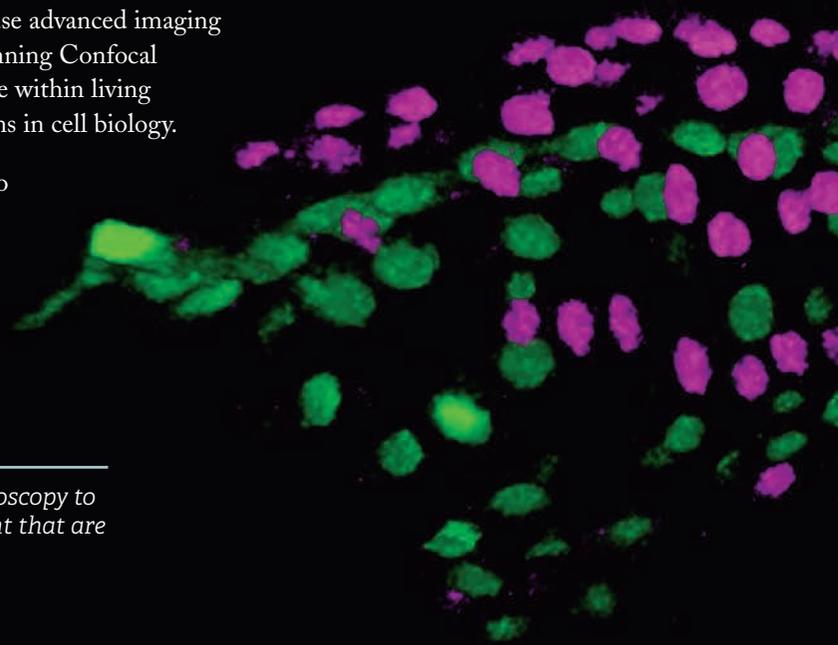
## NEW INSTRUMENTS

### Imaging Core

The Department of Biology has started a new Biological Imaging Core to house advanced imaging systems, including a state-of-the-art scanning confocal microscope. Laser Scanning Confocal Microscopy allows us to see fluorescently labeled molecules and how they move within living cells and has become a powerful technique for answering fundamental questions in cell biology.

New techniques have been developed using this instrument that enables in vivo biochemistry, and physiological measurements of cell and organelle function. Access to versatile instruments like this confocal will permit the expansion of research programs that do not traditionally rely on these instruments (e.g., evolution, organelle physiology), leading to even greater innovation. The Biological Imaging Core allows students at the University of Mississippi to train in these new techniques and to push the boundaries of knowledge using advanced imaging systems. 🌱

*Studying early heart development, Dr. Joshua Bloomekatz uses confocal microscopy to follow the movement of different cell types involved in early heart development that are differentially labeled with fluorescent markers.*



## Green is the New Pink

*New at the UM Field Station is Green Is the New Pink: Young Women Environmentalists in Action. The program supports 25 young women in grades 8 to 11 researching environmental issues.*

**I**ntroductions to real world research strategies generate curiosity about the local natural environment and link to career pathways in environmental science and conservation. Because science, engineering, and math are often perceived as hard subjects it can be tough to convince young people and particularly young women to consider careers in STEM. Green Is the New Pink demonstrates, through hands on participation, that while science can be challenging, the chance to discover something new is fun, rewarding, and worth the hard work.

Students are guided through four field experiences of data collection, data exploration, analysis and interpretation of data, and drawing conclusions. Face-to-face time with scientists supplements an online platform for discussion, reflection, and research into each student's chosen area of environmental study. Each student develops a proposal or project that will affect her local natural environment and presents her work at a culminating event on the university campus. 🌱

Scott Knight, UM Field Station director, shows Green is the New Pink participants some creatures found in local ponds. *Photo by Pam Starling/UM Division of Outreach and Continuing Education*



## The Mississippi Water Security Institute: A Confluence of Water and Interdisciplinary Education

*Professor Clifford Ochs directs the Mississippi Water Security Institute, a two-week interdisciplinary educational program for honors undergraduate students.*



Students explore the Mississippi River led by John Ruskey of Quapaw Canoe Company.  
*Photo by Asean Davis*

The program integrates three topics related to the ways we use and manage the state's water resources—economic development, public health, and environmental protection. Emphasizing the complex, interdisciplinary nature of the topic, students represent a variety of majors, from biology and other natural sciences to business and the social sciences. They are recruited from universities across the state, with 15 to 17 students in each year of the program.

The program has completed its third year, emphasizing a different region of the state in each year. In 2016, MS WSI focused on water use and management in the agricultural Mississippi Delta; in 2017, the program examined water use issues in urban communities including Jackson and Oxford; in 2018, MS WSI turned its attention to water resource issues of coastal Mississippi.



Lilli Gordon,  a biology major.  
*Photo by Ashley Mills*

**“Often we assume the actions of one person don’t have a meaningful impact on the world. The Institute made me see that we, as college students, are the start to real change. Spreading the word about water quality in our community is the start to a real solution.”**

The MS WSI program involves in-class presentations by expert guests, reading and discussion, and extensive time in the field, and across the state. Although not a class (there are no tests or grades), students do compose a White Paper detailing their individual and group learning experiences and insights. Student assessment indicates strong satisfaction with the interdisciplinary approach, experiential design, and practical application of the subject matter, with several students stating that MS WSI reinforced interests in some aspect of water security as a career. 

*The Robert M. Hearin Support Foundation offers support through a generous grant to the UM Sally McDonnell Barksdale Honors College. For more information, contact Dr. Ochs at [byochs@olemiss.edu](mailto:byochs@olemiss.edu).*

**Just last summer,  
Jackson was awarded  
almost \$800,000  
from the National  
Science Foundation ...**

## **Professor Colin Jackson**

2019 CORA LEE GRAHAM AWARD FOR  
OUTSTANDING TEACHING OF FRESHMEN



➤  
Colin Jackson is associate  
chair and graduate  
program coordinator.

**I**f you took Bisc 333: General Microbiology sometime in the last 10 or so years, there's a good chance you were taught by Dr. Colin Jackson. The engaging and entertaining teacher has trained many students in the concepts of microbiology necessary for careers in science, medicine, and dentistry—while highlighting the importance of microorganisms in everyday life—since he joined the Department of Biology in 2006.

An accomplished researcher, Professor Jackson has published 50+ research articles in scientific journals and brought more than \$2.5 million of research funding to the University of Mississippi. Just last summer, he secured almost \$800,000 from the National Science Foundation to look at the microbiome of freshwater mussels and how it relates to genetic and ecological diversity.

“We’ve come to realize how important our microbiome—the bacteria living inside our bodies—is to our health and development, and we’re starting to understand that the same applies to other animals and even plants,” he said.

“Freshwater mussels are a diverse, but endangered, group of organisms in the southeastern USA that are vital to the functioning of many aquatic ecosystems. By determining how these animals interact with their associated bacteria as well as assessing the role of genetic diversity in those interactions, we can understand how an animal’s genetics influences its microbiome and also see how these factors relate to environmental stressors such as pollution and land development.

“The project integrates microbiology with ecology and genetics, and I am fortunate to have a colleague in the department, geneticist Dr. Ryan Garrick, who is happy to collaborate.” 🌱