

UF/IFAS CALS Student to Explore Antarctic Lake with National Team



Davis takes scrapings of ice for tests. She will use this same method to test ice cores taken from Mercer Subglacial Lake.



GAINESVILLE, Fla. — This December, a University of Florida College of Agricultural and Life Sciences graduate student will head far south to the cold of Antarctica.

On Dec. 2, Christina Davis, a microbiology and cell science Ph.D. candidate, will join a team of 37 scientists and staff funded by the National Science Foundation who will explore Mercer Subglacial Lake in Antarctica for the first time. The project, known as Subglacial Antarctic Lakes Scientific Access (SALSA), aims to discover what lies beneath the Antarctic Ice Sheet.

The SALSA project has implications for understanding past and present life under the ice, the movement of water beneath the ice, and how ice sheet dynamics affect global sea level rise. Davis will conduct research for her dissertation while working with her mentor Brent Christner, a UF Institute of Food and Agricultural Sciences microbiology and cell science associate professor. Christner specializes in the study of microorganisms inhabiting environments on Earth that are typically below the freezing point of water.

“I’m looking forward to this life-changing experience,” Davis said. “I know that I will have access to so many scientists who are experts in their fields, and I’m looking forward to collaborating with them in Antarctica.”

The SALSA scientific team will fly by ski-equipped airplane to a field camp in West Antarctica, approximately 600 miles from McMurdo Station, the large, permanent facility near the Antarctic coast where the team will initially arrive. Davis and Christner will reach Antarctica during the Southern Hemisphere’s summer, when temperatures will generally range between 10-20 degrees Fahrenheit and sunlight lasts 24 hours a day. The two scientists will stay for two months.

The field camp lies directly above Lake Mercer, a large freshwater subglacial lake twice the size of Manhattan Island and covered by 4,000 feet of ice. This water body receives no sunlight and therefore cannot support the forms of plant and animal life associated with lakes on the surface, which rely on sunlight to sustain the microscopic, single-celled plants that form the first link in aquatic food chains.

In the SALSA project, researchers will use a high-pressure stream of hot water to bore a two-foot-wide hole from the surface down to the subglacial lake. Team members will then work around the clock for eight days, collecting water and sediment samples that contain microbes, and potentially even harbor multi-celled organisms.

Davis is primarily interested in examining bacteria that derive life-sustaining carbon from methane, a greenhouse gas that is produced in lake-bottom and wetland sediments globally. Although Mercer Subglacial Lake has never been sampled, Davis said it's likely methane-consuming bacteria exist there because Christner found these organisms in another subglacial lake on a previous Antarctic expedition.

Davis will analyze some samples on-site and will ship others back to the UF main campus in Gainesville for further assessment. Ultimately, Davis hopes to find not only methane-consuming bacteria, but also genetic evidence that helps explain how these bacteria evolved to survive in this unique environment.

"I think this project picked me," Davis said. "I like astrobiology, or life on other planets, and understanding how life can occur in extreme environments. I enjoy exploring how organisms can survive in these climates and what their metabolisms are."

A native of Grimes, Iowa, Davis grew up in a family of scientists. Her mother, an entomologist, and her father, a biochemist, encouraged her to run science experiments at a young age. In high school, Davis worked in the same lab as her parents at DuPont Pioneer where she learned about the microbiology behind crop production. Double-majoring in microbiology and genetics at Iowa State University opened Davis' eyes to the world of environmental microbiology. She learned of microbial connections to climate change and other environmental factors.

As a young woman in science, Davis is constantly awestruck by the great minds of men and women in the sciences. Sometimes, Davis said, the feeling of "not being good enough" can creep in when she thinks of

these role models. To overcome this feeling, she talks to other scientists and peers across disciplines and colleges to help find answers to her research questions. Davis finds this humanizes other scientists and makes it easier to focus on her own research.

“When you realize you’re the only person in the world who knows the result of your research, it fills you with such excitement to know you can share this knowledge with everyone,” Davis said.

Davis encourages young scientists to consider majors and careers that will allow them to visit intriguing places, such as Antarctica, and stimulate their enthusiasm for scientific discovery.

“What we [Christner and Davis] do in the microbiological sciences is very visual with direct applications,” Davis said. “You can see for yourself what exactly is happening in the field, in comparison to the medical fields which operate much more on a molecular level.”

Currently, Christner has six undergraduates working in his lab, with two specifically assisting Davis with her research.

“Talk to your professors and graduate students if you’re interested in gaining experience and working in a lab,” Christner said. “I have taken undergraduates to Antarctica, Alaska and Greenland for fieldwork with me before.”

Christner recommends that undergraduates interested in microbiology take a beginner lab course where they will learn the basic skills needed to work in the lab. He also encourages students interested in any branch of science to take statistics and computer programming courses that are crucial for building the skills necessary for students to analyze their own data.

Davis’ list of the Top 5 things to pack for her Antarctic expedition include:

(5) Books for entertainment,

- (4) Thermal socks to keep her feet from freezing,
- (3) Dry shampoo for when showering isn't possible while deep in fieldwork,
- (2) 100 percent ultraviolet light resistant sunglasses that are mandatory in the 24-hour sunlight, and
- (1) Skippy creamy peanut butter, because Davis can't survive without it!

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The College of Agricultural and Life Sciences (CALs) administers the degree programs of the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS). The mission of the College of Agricultural and Life Sciences is to deliver unsurpassed educational programs that prepare students to address the world's critical challenges related to agriculture, food systems, human wellbeing, natural resources and sustainable communities. The college has received more total (national and regional combined) USDA teaching awards than any other institution. Visit the CALS website at cals.ufl.edu, and follow CALS on social media platforms at [@ufcals](https://twitter.com/ufcals).

by Dana Edwards



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