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UNH grad goes to new depths for research study

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Posted: 11/7/08

When she goes outside, Robin Ellwood wears sunscreen to protect herself from the 24 hours of continuous daily sunlight. But in her office, filled with below-freezing water and hidden beneath 15 feet of solid ice, all she has protecting her is an insulated diving suit and, in some cases, a rubber tube providing oxygen from above.

"It stings like crazy when you first get in the water, but once your face is numb it's not so much of a problem," said Ellwood, an alumna and current doctorate student at UNH who also teaches eighth grade science teacher at Rye Junior High School. "Another problem is simply the psychological aspect of being under the ice. I am fortunate in that I don't tend to get too freaked out about that, but if I let myself think about it too much... Well, I need to tell myself to stop."

Hypothermia, on the other hand, isn't a problem.

"Hypothermia is more of an issue when we get out of the water," said Ellwood. "Most dive holes in the McMurdo Sound typically have a shelter built over the hole. This way, the divers are not exposed to direct elements."

For Ellwood, diving into these elements is all in a day's work. Presently living at the McMurdo Station in Antarctica, Ellwood's current research opportunity has brought her to the McMurdo Dry Valleys of Antarctica - a region of the continent completely devoid of any life outside of bacteria, algae, rotifers and teams of researchers.

"There are many photosynthetic microbes here, yet there is no sun for about five months of the year," said Ellwood. "It is interesting to note the different strategies that the microbes use at different levels of the lake bottom."

Ellwood isn't working alone. Also conducting research with her is Peter Doran, an associate professor of earth and environmental sciences at the University of Illinois at Chicago who also joined her on a similar trip to the southernmost continent in 2003. Doran's work yields information about climate change throughout history, according to Ellwood.

"The valleys offer a trove of information about past climatic conditions," said Ellwood, adding that when Doran travels to the valleys, water levels are recorded to help determine past temperature levels in Antarctica. This data is then relayed to multiple areas, including NASA.

"The dry valleys are quite similar to Mars in terms of surface features," said Ellwood. "We can access the dry valleys, so if we find areas in the dry valleys where there is evidence of past water or life, the

rovers on Mars can seek similar areas on the red planet to investigate."

One of the biggest misconceptions about the valleys is in the name, which was earned prior to a period of glaciers receding and leaving behind vast ice-covered lakes, according to Ellwood. Another common misconception - one that comes up quite frequently, she added - revolves around penguins and polar bears.

"Everyone wants to know how many penguins I've seen... [And] there are no polar bears in Antarctica," said Ellwood, adding she may see an occasional Skua - a bird native to the area - and an occasional penguin or seal outside the valley.

"The area is well known for its mummified seals. I have not seen this, and to be honest I do not hope to see them here," she said. "Basically, a trip to the dry valleys for these animals - penguins and seals - is a death sentence. They often get lost, can't find their way back to the open ocean and they starve. There's nothing for them to eat in the valleys."

Ellwood hasn't yet encountered either a seal or a penguin in the valley, and hopes she never does.

"I would basically be traumatized if I did see one because I would desperately want to put it on a helicopter and take it back to the ocean," said Ellwood. "This would be a violation of the Antarctic Treaty."

Ellwood's journey to Antarctica started at a climate change workshop at UNH. When she attended the workshop she heard about "Teachers Experiencing Antarctica and the Arctic" (TEA), a nationwide program set up to connect teachers of grades kindergarten through 12th grade with researchers in the polar regions, according to Ellwood.

She was accepted into the program, and this year marks her fourth trip to Antarctica. For her six-to-eight week absence, a substitute teacher she works closely with fills her shoes. Meanwhile, coursework toward a doctorate from UNH resumes as Ellwood remains in contact with a professor she's taking this semester.

"I am actually wearing three hats down here," said Ellwood, listing the "hats" as being a research assistant and dive master, a PolarTREC teacher - a designation through which she posts pictures and web blog updates about her work and day-to-day life while also keeping in touch with her middle school students at home through the PolarTREC website - and a UNH student. "I am, let's just say, crazy busy."

Eleanor Abrams, assistant professor of science education at UNH and Ellwood's advisor for the past three years, said the research is part of a much larger project aimed at improving the ability for younger students, like those in Ellwood's science classes, to do their own research outside of the classroom.

"What she'd like to do is have students develop research questions around environmental issues and collect data in the environment they are interested in," said Abrams. "Then she takes the kids out to have them answer their own questions and to make them be citizens of the world."

This is the most likely goal of Ellwood's upcoming Ph.D. dissertation - whether prolonged interactivity with an environment improves the quality of a child's scientific education.

"Could we find out if it makes a difference to them in the cultivation of their scientific thinking?" asked Barbara Houston, professor of education and instructor of an epistemology course Ellwood is currently enrolled in and completing while in Antarctica. "People might be more amenable to the idea of kids doing research in this fashion."

It's exciting for the students of Ellwood's class to have their teacher - somebody they have come to know so well - spend time doing research from so far away, according to Houston. It's because of the distance and the scope of Ellwood's interests that she maintains the daily blog, posts pictures and writes about what she's doing and communicates back and forth with her students.

"Some of her students designed a robot that she is using in the Antarctic waters," said Houston. "They have a big investment in it. It is very exciting for them."

When Ellwood returns to New Hampshire by the end of November, she'll be close to finishing her coursework, according to Abrams. After that, she'll begin research for her dissertation.

"I am hoping we go beyond teaching through the test, and instead make [younger students] scientifically literate citizens," said Abrams. "They need to experience authentic environmental problems, and you can't do that through a textbook."

Updates on Ellwood's work and experiences can be found through the PolarTREC website at www.polartrec.com/lake-ecosystems-in-antarctica.

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