

In This Edition:

A Collective Vision Comes to Life
Editor's Note
The Apprentices Become the Masters
Around Campus
Creating Their Worlds
Green and Gold
Citizen Science
Hard Work Under Pressure
Class Notes
Their Classroom, the World
University News
Closing Thoughts

The Apprentices Become the Masters

Cal Poly Biology Students are Among a Small Group of Experts on a New Protein Analysis Method

By Rachel Henry

Cal Poly biology students are among the few experts in the country on a new method of protein analysis that can help predict the results of climate change. Last December they shared their expertise by teaching the process to professors and doctoral students from other universities.

The students planned and led a National Science Foundation (NSF)-funded workshop in environmental proteomics, a method of analyzing how organisms respond to different environmental stresses.

"My group just took over," said Lars Tomanek, professor of biological sciences. "I gave an introduction and a talk at the end, and in between I helped order pizza."

The biologists are studying how environmental conditions affect an organism's production of proteins, which predicts its reaction to climate change. "We can tell by looking at these proteins who will be the winners and who will be the losers," Tomanek said.

Tomanek's group and many of the workshop participants focus their research on marine life. As the climate changes, fish, coral, mussels and other organisms may be subjected to seawater that is hotter and more acidic but contains less oxygen and salt.

Scientists at Northeastern University, the University of Hawaii, and CSU Northridge are studying coral bleaching. The techniques they learned at Cal Poly will help them better understand what conditions are necessary for coral to survive.



"Using this method, we can predict that if the Earth's temperature rises to a certain point, the coral reefs will disappear," Tomanek said.

The method's first step, called two-dimensional gel electrophoresis, measures how much of a protein is being made and is notoriously difficult. Following the students' instruction, nine out of 12 workshop attendees got excellent results with their own protein samples, an impressive success rate.

"Not only was it apparent that the students were skilled in the techniques, but they were also patient and supportive teachers," said Andreas Madlung, a biology professor at the University of Puget Sound. "The workshop was well-organized in every respect — scientifically and administratively — as well as fun, instructive and inspiring."

"As a student," said Michael Garland, a graduate student in biological sciences, "it was a rewarding feeling to be regarded as an expert by people who are experienced and accomplished in their field. I think all of us presenting in the workshop realized that the work we do at Cal Poly is truly on the cutting edge."

In the second step of the analysis, the scientists identify the protein using a tandem mass spectrometer, which measures the molecular mass of unique protein identifiers called peptides. Only three environmental proteomics labs in the country currently have this spectrometer. Using the instrument as an undergrad gives Cal Poly students an unparalleled Learn by Doing experience.

"Our students learn the entire proteomic workflow from the experiment and preparation to the bioinformation analysis. It's really unique that an undergrad or even grad student is involved in the conduct of all the steps along the workflow," Tomanek said.

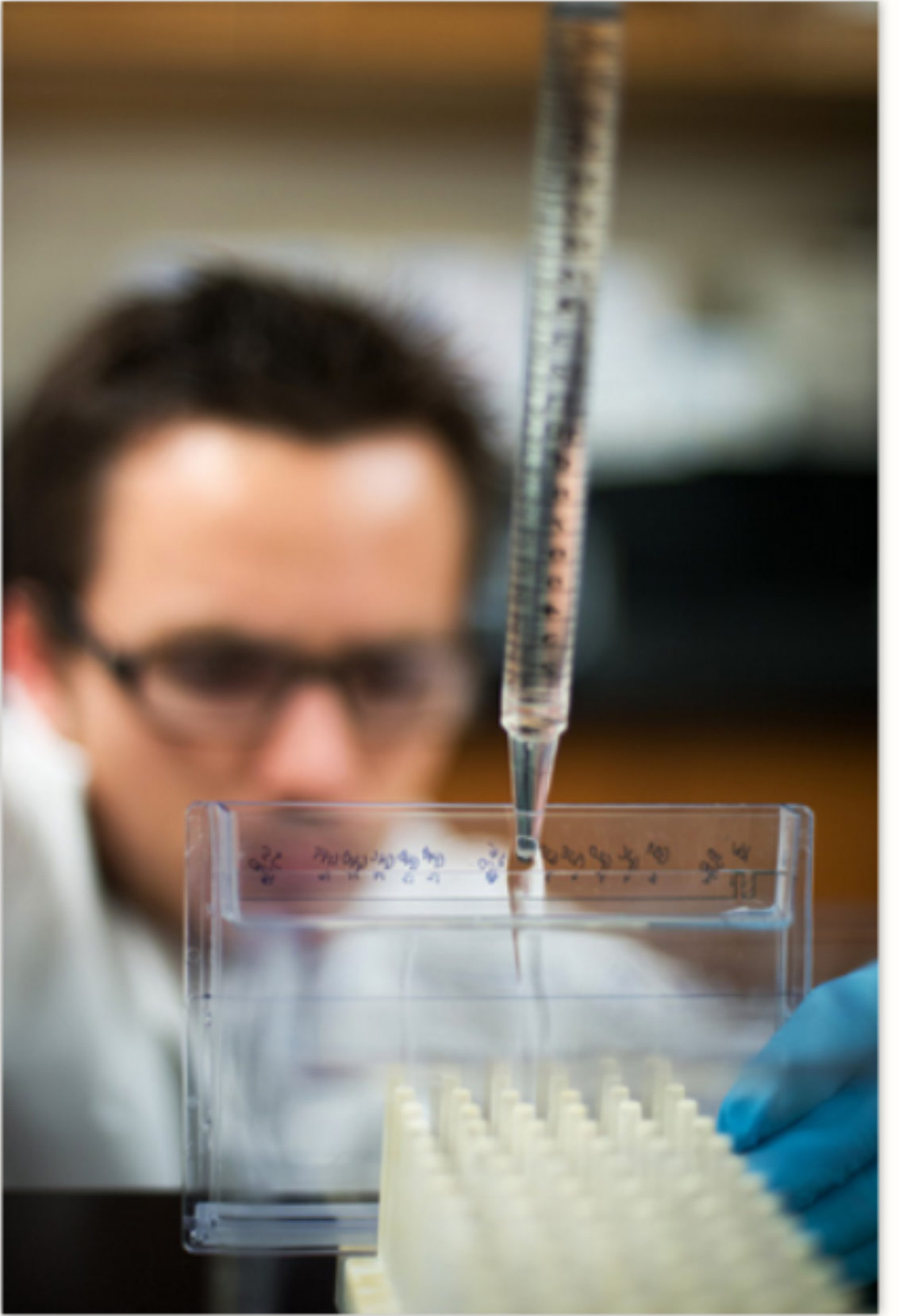
Because the spectrometer is a key instrument in biomedical and pharmacological research, the hands-on experience gives Cal Poly graduates exceptional career opportunities. "Our master's students are getting jobs usually reserved for Ph.D.s," Tomanek said.

"This workshop gave me confidence in my laboratory capabilities that will serve me well in the future," said Joshua Mier, a student who had earned his bachelor's degree only a few months prior to being an instructor.

In the future, Cal Poly's Environmental Proteomics Lab will run the second step of the analysis for workshop attendees who don't have a tandem mass spectrometer on their home campuses.

"One of NSF's grand challenges is how to share and spread technology," Tomanek said. "The NSF program director pointed to Cal Poly's proteomics lab as the only example he's seen of how to address this challenge."

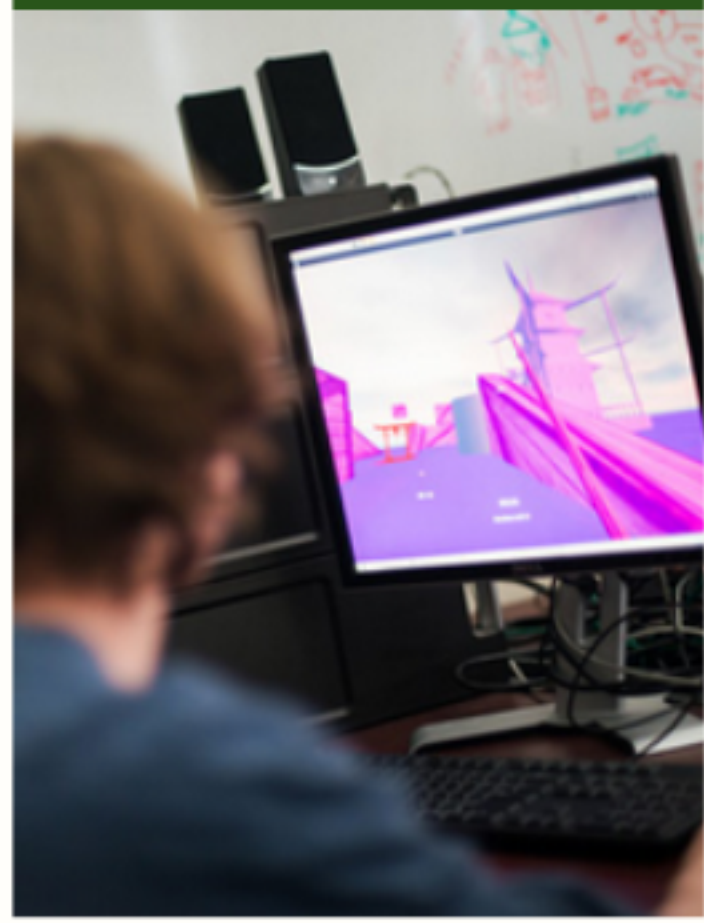
Students, participants and the NSF are excited about the collaborative nature of the workshop. "Biology covers a wide range of possible studies, and it was great to learn about the participants' research and the role proteomics can play in the improvement of their results," Garland said.



Cal Poly biological sciences students work on protein analysis. (Photos by Brittany App.)



The Apprentices Become the Masters
Cal Poly Students are Among the Few Experts on a New Scientific Technique
[Read More](#)



Creating Their Worlds
Alums Make Movie Magic Thanks to Close Ties Between Cal Poly and DreamWorks Animation
[Read More](#)



An Evening of Green and Gold
Images from the Inaugural Event Thanking Donors and Volunteers
[Read More](#)



Hard Work Under Pressure
Tommy Pluschkell Defines the Cal Poly Student-Athlete Model
[Read More](#)