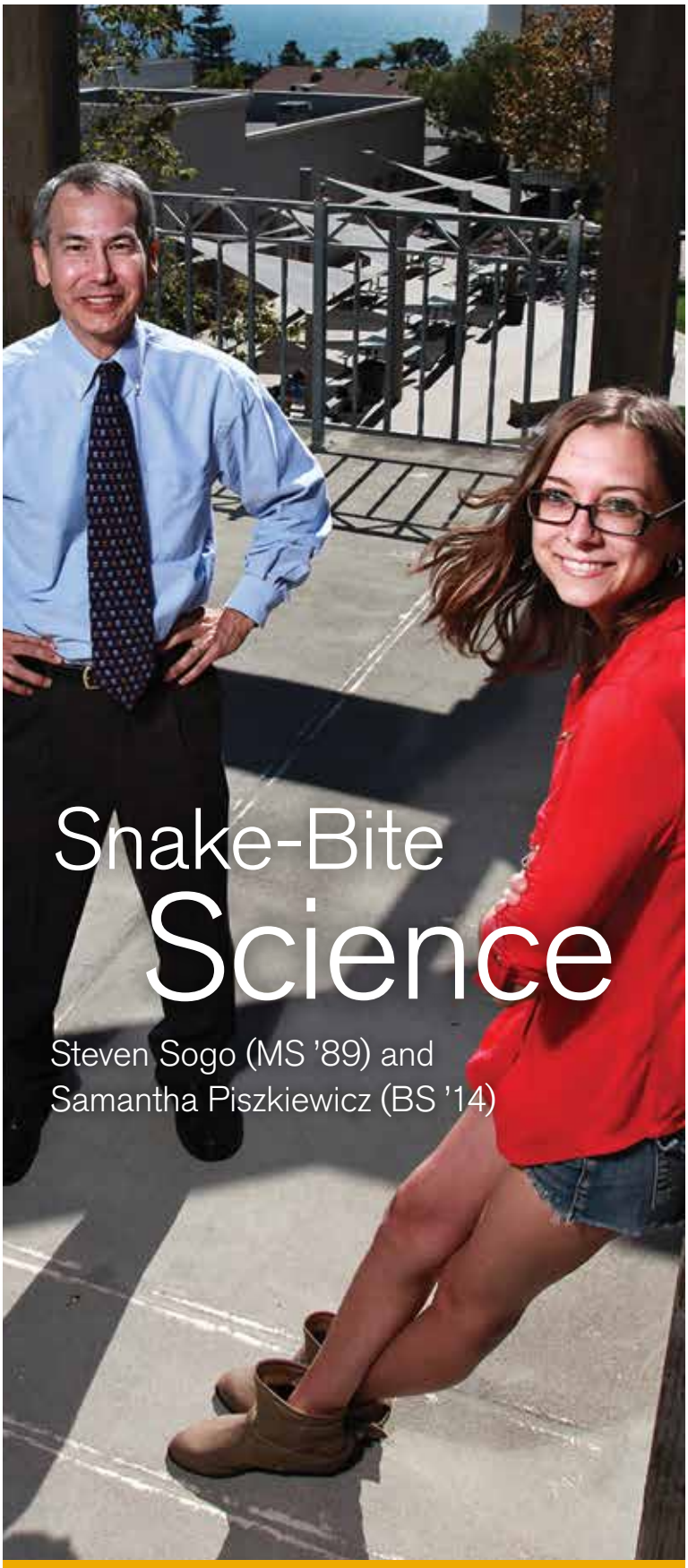

Snake-Bite Science

Steven Sogo (MS '89) and Samantha Piszkiewicz (BS '14)

Alumni stories provided by the Caltech Alumni Association. For more about these stories and to read about other alumni in the news, visit alumni.caltech.edu.

Steven Sogo, a science teacher at Laguna Beach High School, had become frustrated by his chemistry curriculum. On paper, his students performed well in science placement exams, but still, he was troubled. "The type of students who scored high knew how to memorize facts and take tests, but they weren't necessarily good scientists," Sogo says. "I wanted to teach a class that rewarded curiosity, experimentation, and the risk of failure."

So in 2007, Sogo partnered with Ken Shea, a professor of chemistry at nearby UC Irvine. Shea had developed new processes for molecular imprinting—a technique used to create nanoparticles capable of latching onto organic molecules. "We call them 'plastic antibodies,'" Shea explains. One of the first applications was a synthetic antidote to bee venom.

Sogo enlisted Shea's help to establish a similar lab at Laguna High, but the high schoolers needed a target. One of Sogo's students, Samantha Piszkiewicz, voiced her fascination with the Mozambique spitting cobra, which (as its name suggests) spits its venom, a noxious cocktail of protein toxins that break down the lining of cell walls.

Starting in the fall of 2008, Sogo led Piszkiewicz and her fellow students in adapting and applying Shea's techniques for molecular imprinting to the snake venom. The following spring, they had successfully synthesized an antibody. "The first test result we got was so beautiful and encouraging," Piszkiewicz said. "We saw 85 to 95 percent inhibition of cell destruction."

In 2009, the students presented their research at a science competition held at Caltech. "That felt like a homecoming of sorts," Sogo says. "It was a chance to show off the research, and also to introduce my students to a place that made such an impression on me."

It also made an impression on Piszkiewicz—who went on to enroll at Caltech, graduating this past spring with a bachelor's degree in chemistry.

Sogo, meanwhile, continued to work on the snake venom project. New classes of Laguna students carefully refined and documented their procedures, and in 2013 their work was published in *Chemical Communications*, considered one of the field's leading journals.

"They weren't published just because they were high school students," Shea says. "They made a valuable contribution and their work serves as a model for other high schools."

"It's hard to imagine that my first published project is for work I did when I was 16," says Piszkiewicz, who was listed as lead author. Now pursuing her PhD in biophysics at the University of North Carolina, Chapel Hill, she dreams one day of leading her own research lab. "I wouldn't be the researcher—or the person—that I am today without that class."

And perhaps that's where Sogo's real success lies. In addition to creating an antivenom, he is helping scientists like Piszkiewicz to discover themselves.