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## Biophysicist in Profile

### Ana-Maria Soto

“Teaching in a primarily undergraduate university presents some unique challenges for a researcher,” says Ana-Maria Soto, Assistant Professor of Chemistry at Towson University in Maryland. Her own undergraduate career provided a good training ground, as entry into biophysics was a mixture of “serendipity and remarkable teachers and mentors.”

Soto entered college at Universidad Peruana Cayetano Heredia in Lima, Peru, with little idea of her future career path and planned to study psychology. Then “an amazing professor,” *Juan Jimenez Bendezu*, introduced her to the world of chemistry. “I was awestruck by the clarity, logic and beauty of chemistry and couldn’t believe that I had found something that I liked so much,” says Soto.

Her physical chemistry professor, *Carlos Nuñez*, regularly encouraged her to pursue a PhD. She got that opportunity in the Department of Pharmaceutical Sciences at the University of Nebraska Medical Center, recruited by fellow Peruvian, *Luis Marky*, for his lab. Working in the biophysics of nucleic acids provided her first taste of research. “I loved it. Luis gave me the freedom to figure things out on my own but was always available for mentoring.”

Marky says that Soto was smart, hard working and dedicated to research. “She became an independent scientist who actually came out with a model on how to interpret the unfolding of DNA triple helices containing C+GC base triplets. She graduated with 16-17 publications in peer-reviewed journals—maybe a record in the USA?”

Soto did her postdoc in *David Draper’s* lab at The Johns Hopkins University. She admired Draper’s analytical thinking and practice of mining papers for new techniques for his research. In Draper’s lab, she took her graduate school interest in the role of electrostatics in DNA ligand interactions to the next level. Her postdoc project examined the role of electrostatics on RNA folding, an area that she still wants to understand in more detail.

As Soto matured as a scientist, she focused more on the big picture. “I still break down a project into small pieces, but the big picture is always on my mind. That looks like a simple change, but I find that new ideas flow easily while I am designing or engaged in a new experiment but thinking about the big picture.”

After two years teaching in the chemistry department of the College of New Jersey, she accepted her current position at Towson University. She understood from the beginning that maintaining an active research program would help her prepare a good class. Only later did she understand what teaching contributed to her research. “Teaching helps you think more clearly about research,” says Soto. “As you explain a topic to undergraduate students, you dissect the topic so

that every part is clear, justifying your assumptions in concrete ways. You rethink your assumptions and sometimes discover that some may be problematic. Step-by-step dissection allows you to scrutinize your data and make sure there are no loopholes in your research.”

The biggest challenge of teaching in a primarily undergraduate university is balancing a heavier teaching load than is required in research-1 institutions. “In your first years, you tend to spend a lot of time teaching. If you are not careful, the teaching takes over and your research suffers.” She has learned that starting research in the summer is her best strategy. Keeping it going then is not as difficult, “especially when you have the amazing students I have had over the last year,” she says.

Soto says that the most rewarding aspect of her job is introducing an undergraduate student to research for the very first time. “You can see, in some of them, the same spark you felt the first time you were introduced to research.”

“She is an exceptional mentor for the students she oversees in the lab,” says *Amy Smith*, a current undergraduate student in Soto’s lab. “She is always willing to help her students understand the material, no matter how many different ways she needs to explain it.”

*Preeti Sehdev*, who is pursuing a pharmacy degree at Notre Dame School of Pharmacy, says that working with Soto “was one of my life’s best experiences.” She says that Soto taught her about professionalism, positive attitude, punctuality, responsibility, and practicing good and safe lab techniques. “I owe it to her for helping me succeed as an undergraduate and getting the award for professional excellence at Towson University.”

Soto’s current research endeavors to understand the energetic contributions in the binding of aminoglycoside antibiotics to an RNA fragment. She hopes that her results will help in the design of new drugs that will bind better to their desired targets.

Soto’s husband, philosophy professor *Stephen Scales*, also teaches at Towson University. His son, Duncan, lives with them during the summers.

Soto’s family helps her avoid getting into a work-only rut. She visits her father, brother and sister in Peru each year, as well as visiting her husband’s family. “I almost have to be forced into these breaks because there is always more work to finish, but once I am out of the office for a few days, I find it easier to enjoy the trip.”



Soto (second from right) with family members after a recent race.

Between trips, she takes her mind off of work with radio (mostly NPR) and training for occasional half of marathon and 10-mile races. Marathons take too much training time, but she may run another one in 2010.

“Going to the Biophysical Society meeting invigorates my research in a way nothing else does,” Soto says. She also notes that “something as simple as talking with the right person can make a difference in someone’s career.” As a member of the Biophysical Society’s Minority Affairs Committee, Soto seeks to help minority students attend that life-changing meeting or meet that special mentor. “It’s an opportunity to introduce biophysics to bright students who may not normally consider a career in research because of lack of knowledge on the opportunities available to them.”