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Biophysicist in Profile

Luis Marky

Mentoring has been key throughout the career of Luis Marky, Professor in the College of Pharmacy of the University of Nebraska Medical Center (UNMC). He found his way into biophysics under the guidance of a mentor, has been honored for his mentorship of his students, and now promotes mentoring as vital to the success of young scientists.

Born in Piura, Peru, one of Marky's first mentors was his grandfather. Marky spent his twelfth and thirteenth summers in his grandfather's mechanic shop, learning to work the lathe and thinking that he was "bound to become a mechanical engineer." He filled his high school years with science and math courses, including physics, trigonometry and calculus, which he took during his year in Owego, NY, on an American Field Service Scholarship.

After his grandfather's death, Marky's parents pressed him to pursue medicine. He entered Cayetano Heredia University in Lima, and for the first two years was on course for medical school. This is where *William Rieman, III*, entered the picture and became a touchstone mentor for Marky. A Fulbright Scholar from Rutgers University, Reiman offered a course in Instrumental Analysis at his university. As one of two undergraduate students, with other students being engineering professors or researchers from Cayetano Heredia, Marky asked Reiman, "What is the single subject that allows understanding of everything else?" Reiman answered, "physical chemistry."

Though Marky continued in medical school track for two more years, he took extra courses in math and chemistry and took part in laboratory experiments involving human anatomy, physiology and pharmacology. His next semester required direct patient care, and Marky discovered that this was not to his liking as much as research. He withdrew from medical school and applied for graduate study in the USA.

He landed at Rutgers, where Reiman assisted him again by suggesting PhD advisors. Marky opted to work for *Ulrich Strauss* on the physical chemistry of polyelectrolytes. "Another excellent mentor and teacher, he was always available to answer questions and provide multiple suggestions and ideas about how to do excellent research," notes Marky.

His initial PhD project—on the interaction of pyrene with DNA, using absorption, circular dichroism, and fluorescence techniques—had to be abandoned; he needed DNA polymers with known sequences, but they were not available commercially in 1974. In the process, however, he learned a variety of optical techniques and how to do research on the binding of ligands/drugs to macromolecules. He redirected his research to investigating the interaction of cupric ions and other multivalent ions with synthetic polyacids. Marky elaborates, "These

were the alkyl vinyl ether copolymers of maleic anhydride, where the alkyl change varied from one to ten carbons. The shorter alkyl chains behave like polyelectrolytes, the longer chains like polysoaps, and the middle polymers undergo a polysoap/polyelectrolyte transition as the pH is increased, resembling the unfolding of a globular protein.”

During his research, he learned additional experimental techniques such as potentiometry and was exposed to calorimetry, dilatometry, and hydrodynamic techniques. As a teaching assistant, he further solidified his background in the physical sciences by teaching general and physical chemistry and physical/analytical lab. It confirmed for him the adage that “the best way to learn a subject is to teach it.”

After completing his PhD, Marky stayed at Rutgers to do postdoctoral work with nucleic acids, and then worked as a research associate and assistant research professor until 1987. His next ten years were at New York University, and he has been at the University of Nebraska Medical Center since 1997.

“Coming to UNMC has allowed me to apply my expertise to medical problems,” says Marky. “At the moment I am researching the unfolding of non-canonical DNA structures: triplexes, G-quadruplexes, i-motifs and junctions, all formed intramolecularly—and their targeting reactions with complementary strands. This mimics the targeting of mRNA and can be applied in the control of gene expression.” He confesses that he likes “toys” (instruments) and thinks that he has a very complete laboratory for measuring complete thermodynamic profiles for the conformational transitions of macromolecules and for the interaction of drugs with macromolecules.

Barry Gold, Professor and Chair of the Department of Pharmaceutical Sciences at the University of Pittsburgh, was a colleague of Marky’s at UNMC and remains a collaborator. Gold says, “Luis has been a leader among scientists interested in understanding the thermodynamic driving forces associated with DNA and RNA stability... His work on the water

and cations associated with DNA, which often are not observed in crystal and NMR structures, is very detailed and creative. I wish he had been my physical chemistry teacher back in undergraduate school, because he has the ability to bring out the relevance of thermodynamics to chemistry and biology.”

Marky has also become an excellent mentor, honored by UNMC in 2006 with an Outstanding Faculty Mentor of Graduate Students Award. Former advisee *Ana-Maria Soto*, now Assistant Professor in the Department of Chemistry of Towson University, attests that “he is always there for his students and is extremely generous with his time. For instance, I practiced my first seminar 10 times, and Luis sat through all my practices and helped me improve on every single one... He is also a good friend.”

Marky brought mentorship full circle in 1998, when he returned to his alma mater in Lima as a Fulbright Scholar to teach a course in biophysical chemistry and hold a seminar course that

included four scientists from the US. He continues to arrange for US students to work for four weeks in a Lima-based pharmacy clerkship—and gives each the opportunity to visit Machu Picchu before returning home.

Marky’s advice to aspiring scientists: “Look for good mentors. The reason I am what I am is that I had a fantastic mentor. Then work hard, get results and publish those results.”

Marky is married to Blanca, a neurologist whose sub-specialty is in clinical neurophysiology. His son Neal, a psychologist, is married and works in special education in two high schools in New Jersey.



Luis Marky (fourth from left) with pharmacy students and faculty.