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## Biophysicists in Profile Ahmed Heikal & Erin Sheets

Biophysics molded two people into a professional and marital partnership. Ahmed Heikal is Associate Professor in the Department of Chemistry and Biochemistry at the University of Minnesota, Duluth. His wife, Erin Sheets, is Associate Professor in University of Minnesota's College of Pharmacy, where Heikal is also an adjunct professor.

Sheets grew up in a small rural Pennsylvania town with one stoplight and no fast-food restaurants. She was the first college graduate in her family. Her tool-and-die-maker dad ran a tool shop with her mom. A quarter of the way around the world, Heikal was born to a limited-resource farmer father and stay-at-home mom in a farming community in the center of Egypt's Nile Delta—and was the only person in his family to read and write.

Sheets' parents encouraged her curiosity and academic excellence, adding educational activities to family trips. Heikal's parents enabled his education by relieving him of farm work when he needed to study and ensuring time for play and adequate sleep. His two older sisters worked to help support the family while he attended school.

In middle school, Sheets left the rancher where she shared a room with one of her two sisters and walked to the end of the driveway to catch the bus. Heikal rose from the floor in his family's four-room house—two rooms to live in (one in winter), one for storage, and a large one for the animals—and walked a few miles through gardens and groves to the junior high school where he studied canning and gardening in addition to his academic classes.

Sheets' high school chemistry teacher, *Ronald Schultz*, ignited in her a love for the logic of science. "In his clear way of teaching, I got this epiphany that I could do this and make a difference," she says. Heikal credits his outstanding high school biology teacher with encouraging him to pursue higher education and study abroad. After earning BS and MS degrees in physics from Tanta University, the poor kid from the Nile Delta found himself at California Institute of Technology, studying molecular dynamics of isolated molecules in molecular beams using ultrafast laser spectroscopy, with Nobel Laureate in Chemistry, *Ahmed H. Zewail*. "He gave me the biggest break in my professional life," Heikal notes. "While it was intimidating at times to work with him, I wouldn't be here today without his unconditional support. His enthusiasm for science and the scientific approach helped shape me as a scientist."

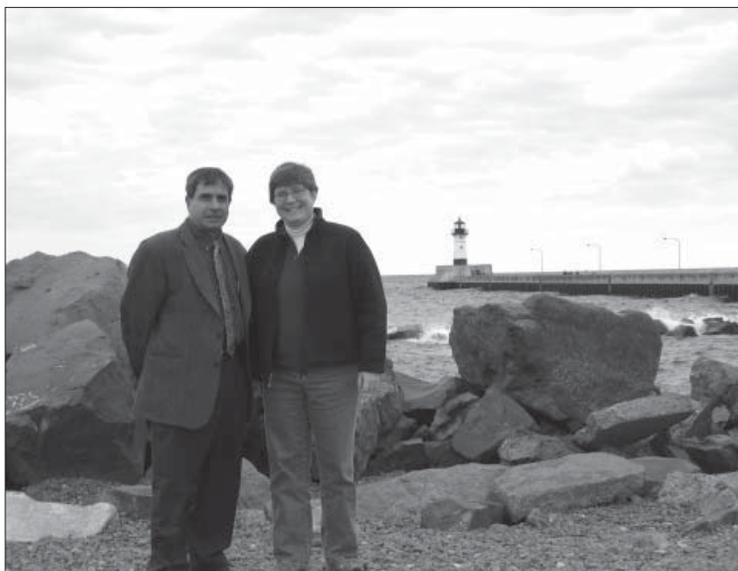
As a research associate in the lab of *Watt Webb* at Cornell University, Heikal says, “Switching from isolated small molecules to large biomolecules in complex environments such as cells or tissues, I became fascinated by the challenges and opportunities in biophysics and the leadership and scientific integrity of Professor Webb.” Webb remembers Heikal as “lively, innovative, and very easy to work with. As [Heikal] built his lab, he was extremely good at putting together experimental apparatus in an innovative, effective way. While he was here, he diagnosed the source of blinking in quantum dots, though he didn’t get credit for it.”

During Heikal’s stint with Webb, Sheets was also at Cornell for postdoc work with *Barbara Baird* and *David Holowka*. Sheets’ and Heikal’s paths merged there—when she introduced him to biomembranes and their dynamics—and have paralleled since.

“We recruit intellectually fearless students who want to tackle scientific problems using any tool available,” says Sheets. *Angel Davey*, IRTA Postdoctoral Fellow at the Laboratory of Immunogenetics at the National Institutes of Health, was the team’s first graduate student. “Working with two people with such complementary, yet different, approaches to science is not always easy, but I think I gained the best of both worlds. Erin, the receptor signaling expert, gave me an interesting experimental problem and taught me good experimental design, writing and teaching. With a hard-core physics background, Ahmed taught me practical aspects of biophotonics. Ahmed simultaneously investigates many different biological systems such as energy metabolism, model membranes, protein dynamics, and immunoglobulin E receptor signaling, while Erin focuses primarily on one system, immunoglobulin E receptor signaling.”

“As a biophysicist herself, Erin is very helpful to me and my students,” says Heikal, “and I trust her instincts.” Writing together was traumatic, however, until they learned how to

critique each other’s writing and science more effectively. “The challenge of having my wife as a colleague and collaborator is that it sometimes feels as if I am at work 24/7,” says Heikal. Sheets sees the at-home work or science talk to be less intense. “I like working with Ahmed,” Sheets says, “because we have our own independent lines of research, but complementary strengths. I’m more bio; he’s more physics. I’m more bench science; he’s more hard-core math. Both of us do microscopy—and my dad makes custom pieces for us—but our imaging systems are complementary in terms of their capabilities, so we don’t duplicate efforts.”



Heikal and Sheets enjoying a day at Lake Superior in Duluth.

Despite the threat of round-the-clock science, the couple balances their life together by delighting in everyday joys, like pampering their cats, gardening, cooking together, and getting outside. Both have outlets as active members of the Biophysical Society. “[The Society] can play a leading international role in improving the perception and culture of interdisciplinary research,” Heikal notes. He served on the Education Committee and participates in a number of subgroups. Sheets currently chairs the Membership Committee.