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Biophysicist in Profile

RICHARD ALDRICH

Biophysicist, teacher, musician, prankster: all useful words when describing Richard Aldrich, Professor and Chair of the Section of Neurobiology in the School of Biological Sciences and Karl Folkers Chair II in Interdisciplinary Biomedical Research at the University of Texas at Austin. And on March 7, 2011, Aldrich became the 52nd President of the Biophysical Society.

From a young age, Aldrich held a solid vision of his ability to contribute to science in a meaningful way. “During high school the environmental movement started and I was convinced that I wanted to be a professional ecologist,” he says. This conviction led him to the University of Arizona, where he took almost every available biology course. It was neuroscience, however, that grabbed his interest with such force that he decided to apply to graduate school in this field.

He ended up at Stanford, where his work with *Stuart Thompson* and *Peter Getting* introduced him to ion channels. “We needed large molluscan

neurons to voltage clamp with microelectrodes,” he says. “During this time Neher and Sackmann’s first paper on single channel recordings from acetylcholine receptor channels was published, changing my, and others’, outlook and convincing

“Like other great scientists, Rick has the ability to see the big picture as well as understand the fine underlying details at a deep level, and has no problem linking the two.”

—RICHARD LEWIS

me to pursue postdoctoral training in single channel recording and more quantitative biophysical approaches to channel and membrane function.”

More influential papers followed, reinforcing his conviction to seek such a postdoc. He recalls Anderson and Stevens’ work on fluctuation analysis, Neher and Steinbach’s paper on local anesthetic interaction with ion channels, Hille and Schwartz’s work on selectivity and permeation, and Armstrong and Bezanilla’s papers on gating currents. He took a postdoc position in Yale University’s physiology department, where he was inspired by working with *Knox Chandler* and *Chuck Stevens*. “I learned much from both of them,” he says. “The challenging intellectual environment in the Yale department was critical in my scientific and intellectual development.”

Aldrich likes to do his own intellectual thing. Growing up, his parents reinforced his cerebral independence. His father, an exploration geophysicist for an oil company, taught him about seismic recordings during field visits and found summer jobs for him throughout his college

years with companies doing seismic surveys in the Gulf of Mexico. His mother, a homemaker, contributed to his critical thinking training in her own way; she “actively honed my intellect by insisting that I never got away with opinions that I could not justify, regardless of whether she agreed with me,” says Aldrich.

“I was also greatly influenced by Mr. Grant, my renegade ninth grade science teacher, who believed creative thinking and experimentation were the way to learn science,” he says. Mr. Grant’s labs were akin to a choose-your-own-adventure storybook. “We would often show up for labs where we were only given a topic, such as ‘heat conduction and thermal expansion’ and a bucket full of simple apparatus and materials,” Aldrich says. “Our goal was to find something out and convince him that we had actually learned something.”

Aldrich has continued to use the fundamentals of this independent teaching style, seen as outside the box in the 1960s, in developing his own teaching methods over the years, a task to which he brings no small amount of skill. *Richard Lewis*, Professor of Molecular & Cellular Physiology at Stanford University, has helped Aldrich create innovative courses and teaching methods since the early 1980. “We developed new courses for teaching the physical principles of physiology in a way that allowed students to build their level of understanding from basic concepts—thermodynamics, diffusion, ligand binding and kinetics—to more complex systems [such as] the Hodgkin-Huxley model and examples of extreme physiological adaptations,” says Lewis. Following the same instructive principles, the duo also fashioned a course on ion channel biophysics. “Rick has always been dedicated to developing non-classical, non-didactic and engaging modes of teaching, in which the students are required to bring what they know into the discussion,” Lewis says. “As a result, he is an unusually effective teacher.”

According to Lewis, what he calls Aldrich’s “non-classical approaches” are revealed in his

musicianship, too. Upon meeting Aldrich—Aldrich was a postdoc, Lewis a grad student—he was struck not only by the veritable

library of music Aldrich cultivated but also his exhaustive familiarity with every LP. “What impressed me the most was his record collection—easily 10,000 records, mostly jazz and rock, and his encyclopedic knowledge of them all,” recalls Lewis. Aldrich himself is a drummer, performing with fellow scientists in bands such as Ramon and the Cajals and Fleabit Peanut Monkeys.

Aldrich is also something of a jokester. Whether it’s pulling pranks at the annual departmental retreat, heckling colleagues during talks at conferences, or making humorous comments to his friends, Aldrich certainly keeps it lively. “Rick is the master of biting wit,” says *David Clapham*, Professor of Neurobiology at Harvard Medical School and friend of Aldrich since the latter’s postdoc days. “But they are never mean-spirited,” Clapham adds of Aldrich’s jokes.

Today, Aldrich’s lab is grappling with understanding the coupling of ligand binding and membrane voltage changes to channel opening conformational changes, using simultaneous fluorescence spectroscopy and patch clamp, along with other tools of molecular biophysics. “

Looking ahead, Aldrich continues to see for himself a role in which to meaningfully contribute to science, especially to biophysics. “The confluence of physical science and biological systems offers such a wealth of interesting questions,” says Aldrich. “Future biophysicists will have more integrated training in physical sciences and biology, as opposed to the past where biophysicists came up as one or the other. I hope to help with such integrated training programs.”



Aldrich playing the drums.