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Biophysicists in Profile

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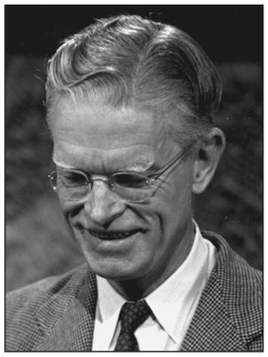


Robley Cook Williams

As the first president of the Biophysical Society, Robley C. Williams' goal was to expand the influence of biophysics and to help establish it as a recognized field of science. Little did he know how far that effort would go.

Born in 1908, Williams was enthusiastic about science, especially astronomy, from an early age. His family moved constantly within California, causing him to attend more than a dozen schools before graduating from Pasadena High School. He attended Cornell University on an athletic scholarship, where he received his BS in 1931. He then earned a PhD in Physics in 1935. Still interested in astronomy, he accepted the position of assistant professor of Astronomy at the University of Michigan.

"He once described himself as an 'intellectual butterfly'"

In 1941 Williams, like many others, was recruited for war work. During that time, Williams was introduced to viruses. "Viruses became his favorite object of study, because of their simplicity of form and their seeming complexity of biological activity," says son Robley C. Williams, Jr. "He became fascinated by the world of the very small." Leaving astronomy behind, Williams returned to the University of Michigan in 1945 as an associate professor of Physics. Five years later he was invited to the University of California at Berkeley by Wendell Stanley, to serve as a Professor in the then-new Department of Virology. He was elected to the National Academy of Sciences in 1955.

Although he enjoyed teaching, Williams remained loyal to the laboratory, where he preferred to work. That was the attraction that Berkeley offered. "A freedom from undergraduate teaching responsibilities was part of the attraction of his post at UC Berkeley," states Williams, Jr. "Contentment, for him, was found in the laboratory."

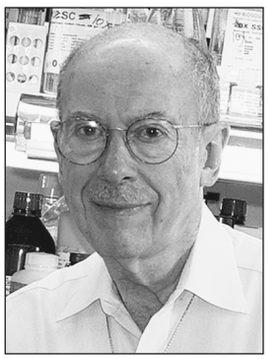
His research was aimed at studying the structure of viruses, but his interests often shifted. "He once described himself as an 'intellectual butterfly,'" explains Williams, Jr. "He often worked only briefly on a particular topic before being attracted by another." Williams was also involved in creating new biophysical techniques such as freeze etching and particle-counting by the spray-drop technique. In 1954 Williams, together with biophysicist Heinz Fraenkel-Conrat, reconstituted the infectious tobacco mosaic virus from its separated protein and RNA components. Williams later worked with Kenneth Smith and Roy Markham at the MRC laboratory in Cambridge, England. The three of them discovered that the insect virus, Tipula iridescens, was icosahedral in shape, the first such virus observed.

Williams contributed to Berkeley in many other ways, including serving as the Chancellor's Faculty Athletic Representative and as President of the Council of the Athletic Association of Western Universities. From 1964 to 1969 he was Associate Director of the Virus Laboratory at Berkeley. He remained Professor of Biophysics and Professor Emeritus at the University until 1985, and continued to actively work in the laboratory through most of his retirement.

In 1957 Williams attended the first annual Biophysical Society meeting and in 1958 he was elected the Society's first President. According to his son, Williams "attended meetings and pre-

sented papers as long as he could." From 1961-1967 he was President of the Commission for Molecular Biophysics of the International Union of Pure and Applied Biophysics. He was also a consummate reviewer of biophysical papers and served on the editorial boards of numerous journals, including *Biophysical Journal* and *Comprehensive Virology*.

Robley Cook Williams died on January 3, 1995, at the age of 86. He had two children, Grace and Robley, Jr. Grace remains active in theater and Robley, Jr., is a Professor Emeritus of Biological Sciences at Vanderbilt University.



Gary Felsenfeld

Gary Felsenfeld, Chief of the Physical Chemistry Section of the Laboratory of Molecular Biology, NIDDK, cannot remember a time when he was not interested in science. Born November 18, 1929, in New York City, by the age of seven Felsenfeld was already interested in understanding how things worked. His parents took this as evidence that he would have a career in medicine, a not uncommon assumption in those days when science research was not a popular or well understood choice. But when he was accepted to Stuyvesant High School, which specializes in science, engineering and mathematics, Felsenfeld began to realize that he was interested in science, rather than in the practice of medicine. This distinction was further clarified when, in his last high school year, he won a trip to Washington as a finalist in the Westinghouse Science Talent Search. While there he met a number of scientists who encouraged him to believe that he could have a successful career in science, and that this did not require a medical degree. "I got the idea that what I wanted to do was some combination of mathematics, physics and biology, to apply exact physical methods to biological problems," says Felsenfeld, and "in those days, there wasn't much like that being done."

In 1947 Felsenfeld graduated high school and entered Harvard. During his second year there he met his tutor and mentor John Edsall, a distinguished physical biochemist (the term 'molecular biology' had not yet been coined). During the three years he spent meeting once a week with Edsall, he became certain that his future would be in biological research. "Edsall worked very hard to persuade me not to go to medical school," says Felsenfeld. "He essentially confirmed and reinforced what I had thought in my high school fantasy, that theoretical and experimental physical chemistry were the best ways to prepare for the future of biology." With that in mind, and with Edsall's encouragement, he headed to Caltech for graduate school.

At Caltech he worked with some of the best researchers, including Linus Pauling, who had recently discovered the alpha helix and who became Felsenfeld's thesis advisor. "I would meet with him once every two, three, or four weeks," says Felsenfeld, whose thesis topic was concerned with the theory of ferromagnetism. "Very often he could tell me what answer I was going to get before I had done the calculation." While there he met David Davies and Alex Rich for the first time, both of whom were postdoctoral fellows in the Chemistry Department. After Caltech, Felsenfeld spent a postdoctoral year at Oxford where he continued theoretical studies, principally on the application of crystal field theory to the prediction of the structure of transition metal complexes. At Oxford he worked with C.A. Coulson, a distinguished theoretician and Professor at the Mathematical Institute. At the end of his postdoctoral year Felsenfeld's draft board told him that he had to meet his military obligations. Like many other young scientists at that time, and with the help of Alex Rich who was already there, he obtained a commission in the Public Health Service to work at NIH. There, he joined both Alex and David Davies, who came to NIH at about the same time. During these years they took advantage of the availability of synthetic polyribonucleotides, synthesized for the first time by the group in Severo Ochoa's laboratory, to study the physical chemistry of ordered polynucleotide structures. This led to their discovery of the first three-stranded nucleic acid. "That was a very exciting thing to do as a first project," says Felsenfeld.

"NIH has been scientifically extremely supportive, all these years; they have always understood what we were doing and why it was important"

At the end of his enlistment, he left NIH to accept an invitation by Max Lauffer to be an assistant professor at the University of Pittsburgh, at that time one of the few universities with a biophysics department. He remained there for the next three years, but an irresistible invitation from his friends led Felsenfeld back to NIH. This group of young scientists had obtained permission to start their own laboratory, which became the Laboratory of Molecular Biology within the Institute of Arthritis and Metabolic Diseases (now NIDDK). "Off we went," states Felsenfeld, "each independently but as a group of comrades." One advantage was that the NIH intramural program encouraged scientists to undertake 'risky' projects for which the outcome was uncertain but potentially important. Also, scientists were free to work on science all day, with little worry about administrative tasks. "NIH has been scientifically extremely supportive, all these years; they have always understood what we were doing and why it was important," states Felsenfeld. "Over the years the members of the Laboratory of Molecular Biology have produced outstanding sci-

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Implications of beta-subunit Resemblance to the MAGUK Superfamily. *Henry Colecraft,* Johns Hopkins University School of Medicine

Calcium Channel Modulation by G Proteins. *Gerald Zamponi*, University of Calgary

Calmodulation of Calcium Channels. *David Yue*, Johns Hopkins Universtiy School of Medicine

Calcium Channel Splice-variant Connection to Pain. *Diane Lipscombe*, Brown University

Biological Implications of Calcium-channel beta-subunit Knockouts. *Veit Flockerzi*, Universitat des Saarlandes

Excitation-transcription Coupling of Calcium Channels. *Richardo Dolmetsch*, Stanford Universtiy

Membrane Structure & Assembly

Leonoid Chernomordik, NICHD, NIH, Chair

Biological Membrane Fusion: Mechanisms and Intermediates

Elastic Model of Membrane Fusion and Fission Intermediates. *Michael Kozlov*, Tel Aviv University

Entry Mechanism of Viruses by Single-particle Tracking in Live Cells. *Xiaowei Zhuang*, Harvard University

Structural Studies of Class II Viral Membrane Fusion Proteins. *Felix Rey*, Institut Pasteur

A Structure-Based Working Hypothesis For The Function of the Flu Fusion Peptide. *Yinling Li*, University of Virginia

Imaging Single Virus Entry into Cells: Hemifusion, Pore Formation and Pore Growth. *Gregory Melikyan*, Rush College

Hemifusion in SNARE-mediated Membrane Fusion. *Yeon-Kyun Shin*, Iowa State University

SNARE-mediated Membrane Fusion: Characterization of a Hemifusion Intermediate on Native Yeast Vacuoles. *Andreas Mayer*, Universite de Lausanne

Motility

Anne Houdusse, Institut Curie, and *Roberto Dominguez*, Boston Biomedical Research Institute, Subgroup Co-Chairs

The Structural Basis of Form in Function and Regulation. *Michael Rosen*, HHMI and UT Southwestern Medical Center

From Noise to Molecular Causality: Deducing the Mechanisms of Cell Protrusion from Intrinsic Heterogeneity in Cytoskeleton Dynamics. *Gaudenz Danuser*, Scripps Research Institute

Structural Basis for Myosin V Discrimination between Distinct Cargoes. *Lois Weisman*, University of Michigan

Myosin Motors in Human Parasites: New Classes and New Functions. *Dominique Soldati*, University of Geneva

Dynein and Directionality. *Erika Holzbauer*, University of Pennsylvania

What Single-motor Mechanics can Tell us about Mitosis. *Joe Howard*, Max Planck Institute, Dresden

Myosin VI : A Kinesin among Myosins. *Lee Sweeney*, University of Pennsylvania

Discussion Session—From Selected Abstracts. *David M. Warshaw*, University of Vermont

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ence. Seventeen alumni or members of the laboratory have been elected to the National Academy of Sciences."

For many years Felsenfeld has carried out research on chromatin structure, nuclear organization, and regulation of gene expression in vertebrates. The work is largely concerned with molecular and cell biology, but there is also a continuing interest in the physical chemistry of these systems. Now, as in years past, many other young scientists work in Felsenfeld's lab with whom he has daily contact. Although he encourages them to work hard, "young scientists should not get caught up in working so hard that they can't enjoy what they accomplish," Felsenfeld says. "When they have a good experimental result or make a valuable discovery they should take a little time to enjoy it." He adds that without the pleasure of discovery, a scientist's life would not be very attractive.

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Felsenfeld and Davies (profiled in the November/December newsletter) attended the first meeting of the Biophysical Society in 1957 together. Both are still members of the Society. Felsenfeld, who was just starting out in the nascent field remembers being an avid listener at that meeting and medting numerous people with common interests who became lifelong colleagues and friends. Although he does not now attend the Annual Meeting regularly he still keeps up to date on the activities of the Society and is deeply involved in many of the areas that come within the Society's range of interests.

For the past ten years Felsenfeld's work has focused on epigenetic mechanisms, a natural extension of his interest in chromatin structure and function. This was a direct consequence of his chromatin studies, which helped in the early understanding of how DNA is packaged within the eukaryotic nucleus, and how transcription factors regulate expression of specific genes, especially in erythroid cells.

Outside of science, Felsenfeld's interests include photography, gardening, cooking, and his eight grandchildren, all of which keep him busy. But he still spends most of his time working at NIH in the same lab that he helped to create.