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## Alexander Rich dies at 90; made major contributions to molecular biology

by [Martin Weil](#)

Alexander Rich, one of the principal figures in molecular biology who was known for advancing knowledge of the DNA and RNA molecules that provide the blueprints for life and for helping lay the groundwork for several areas of modern biotechnology, died April 27 at a hospital in Boston. He was 90.

The death was announced by the Massachusetts Institute of Technology, where he joined the faculty in 1958 and continued going to the laboratory until his hospitalization about two months ago. No cause of death was reported.

The son of Eastern European immigrants who never finished high school, Dr. Rich held bachelor's and medical degrees from Harvard and garnered many of the top prizes in science.

Regarded as an inspirational mentor, he trained and kept ties to generations of young scientists, worked to curb the nuclear arms race, and formed bonds with Soviet and Chinese counterparts to try to prevent the Cold War from turning hot.

His scientific interests included searching for life beyond Earth and trying to find biochemical keys to the origin of life.

He was particularly well known for achievements in hybridization, the pairing of two single strands of DNA or of RNA, or of one strand of DNA with one of RNA.

By such means, he helped elucidate the properties of RNA, finding it to have the same double-helix shape as DNA. He also helped demonstrate its manifold functions: reading the genetic code carried by DNA, transmitting the coded instructions, and then following those instructions to assemble vital proteins.

The work on hybridization is regarded as integral to creating much of modern biotechnology, with applications in diagnostics, forensics, genealogy and gene sequencing.

Dr. Rich's work on ribosomes, the protein-making equipment within cells, was also highly regarded by fellow scientists.

With 19 other world-class scientists — including James D. Watson, Francis Crick, Edward Teller, Richard Feynman and Sydney Brenner — Dr. Rich had a place in the RNA tie club, whose members wore neckties emblazoned with a diagram of the molecule.

In work that would earn them the Nobel Prize and an esteemed place in science history, Watson and Crick proposed in 1953 that the DNA molecule took the form of a double-helix, two molecular strands winding around each other to form a kind of molecular spiral staircase. Their proposal conformed to the available evidence and provided a mechanism for heredity.

Among the foremost of the scientists who headed into the territory thus thrown open was Dr. Rich. By the early 1970s, he had helped provide important experimental confirmations of the Watson-Crick model and cast light into areas that remained mysterious.

Using X-ray crystallography, Dr. Rich provided a picture, detailed to the level of individual atoms, of the actual structure of one form of the DNA molecule.

“I was very pleased,” Watson said Friday in an interview. While the Watson-Crick model had achieved widespread acceptance and went virtually without challenge, Dr. Rich’s picture and the additional confirmation it provided was “very comforting,” Watson said.

However, Dr. Rich was probably better known for his hybridization work, performed 60 years ago with the relatively primitive techniques then available and without use of the enzymes many had thought necessary.

The area in which Dr. Rich worked has been called structural biology and deals with how the shapes of molecules, not merely their atomic constituents, determined their biological roles.

Dr. Rich found a DNA structure that spiraled upward to the left, and was known as z-DNA as opposed to the more common, right-spiraling b-DNA proposed by Watson and Crick. Proceeding on the principle that function followed form, scientists have expended great effort in trying to determine the biological purpose of left-handed DNA.

Alexander Rich was born in Hartford, Conn., on Nov. 15, 1924, and grew up in Springfield, Mass. While in high school, he worked at night at a plant that manufactured rifles, in a role that involved him in making the spiral grooves in the barrel. These imparted rotation to the bullet, enhancing accuracy.

He won a scholarship to Harvard but interrupted his education to serve in the Navy during World War II. Afterward, he received a bachelor’s degree in biochemical science in 1947 and a medical degree in 1949.

From 1949 to 1954, he went to Caltech as a research fellow in chemistry with Linus Pauling, who went on to win the Nobel in chemistry and later the Nobel Peace Prize for his activism against the proliferation of nuclear weapons. Dr. Rich spent the next four years in charge of the physical chemistry section at the National Institute of Mental Health.

From 1969 to 1980, he participated in NASA's Viking mission to Mars, developing experiments aimed at searching for Martian life.

In 1995, he received the National Medal of Science, the highest scientific honor bestowed by the federal government. He was a member of the National Academy of Sciences, the French Academy of Sciences, the Russian Academy of Sciences and the Pontifical Academy of Sciences.

Survivors include his wife, the former Jane King; four children; and seven grandchildren.

One of his sayings appeared a blend of Thomas Edison, who defined genius as "1 percent inspiration and 99 percent perspiration" and of Louis Pasteur, who asserted that "chance favors only the prepared mind."

Dr. Rich put it this way: "Persistence is luck."

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