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Frank H. Westheimer (1912–2007)

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Frank Henry Westheimer, outstanding research scientist, excellent teacher, and fine public citizen, one of the key figures in 20th-century chemistry, died at his home in Cambridge, MA, on April 14, 2007, at age 95. He was the Morris Loeb Professor of Chemistry Emeritus at Harvard University.

Westheimer was at the forefront of a major revolution in the field of chemistry that involved the sophisticated integration of the fields of physical and organic chemistry and the use of this approach to determine in unprecedented detail the way in which chemical reactions take place. These fundamental advances in the theory of chemical reaction mechanisms are the bedrock of modern chemistry and the basis for much of its current success in guiding research on the creation of complex molecules and the invention of new medicines. Using his great proficiency in mathematics and physical–organic chemistry, Westheimer turned his attention by 1950 to the study of enzyme reactions and biochemistry. Here, too, his pioneering studies had a profound and lasting impact, this time on biological and biochemical processes.

Over a span of four decades, Westheimer repeatedly demonstrated an ability to take up a fundamental scientific problem—one that appeared either insoluble or very difficult—and to solve it in an elegant and completely definitive way. This approach defined a unique style of research and became a recognizable personal style. He enjoyed going on to new challenges more than exploiting the large new areas that he had opened up. On the occasion of receiving the Priestley Medal, the highest recognition of the American Chemical Society (ACS) in 1988, Westheimer remarked, "Whether I would have made a larger contribution to chemistry if I had done fewer things and exploited them better, well, no one will ever know." What is certain is that his research was deeply influential to his colleagues and empowering to their science.

Among his physical organic studies was one with Joe Mayer of the rate of rotation of optically active biphenyls calculated from the principles of physics. Using electrostatics, bond bending, bond stretching, and similar chemical forces, he was able to calculate the changes in rates of rotation from first principles, a study that was pioneering for that type of calculation at that time. He later used this approach to calculate changes in rates of enzymatic reactions, particularly differences in rates due to differences in electrostatic attraction and repulsion.

One of his major enzyme studies was the demonstration with Birgit Vennesland that the two hydrogens on the alcoholic carbon of ethanol were not equivalent and could be distinguished in an enzymatic reaction.

Another Westheimer trademark was his inexhaustible supply of wise aphorisms. For example, advice to a research student: "Why spend a day in the library when you can learn the same thing by working in the laboratory for a month?"

Frank Henry Westheimer was born in Baltimore, MD, on January 15, 1912. He attended Dartmouth College and graduated

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summa cum laude in 1932. His father, a successful Baltimore stockbroker, at first questioned his decision to major in science but became enthusiastic after talking to Dartmouth faculty. Westheimer entered the graduate program at Harvard in 1932 to study under James B. Conant. Westheimer later recalled presenting an idea to Conant, who advised: "It may not work, but if it does, it will be a footnote to a footnote in the history of chemistry." This casually imparted wisdom was clearly taken to heart.

After receiving his doctorate at Harvard in 1935, Westheimer went to Columbia University as a National Research Fellow in the then-new field of physical–organic chemistry. He accepted a faculty position at the University of Chicago in 1936, and in 1937 he married Jeanne Friedmann. During World War II, he was a supervisor at the National Explosives Research Laboratory. After the war, he resumed his post at the University of Chicago, where he remained until moving to Harvard in 1953. At Harvard, he was the Morris Loeb Professor and an admired teacher of both undergraduate and graduate students.

Westheimer was the recipient of numerous honors and honorary degrees, including the U.S. National Medal of Science, the U.S. National Academy Award in Chemical Sciences, the Robert A. Welch Foundation Award in Chemistry, and many ACS awards. His national service extended far beyond his involvement in World War II research. He served as a science adviser to President Lyndon Johnson, and in 1966 he chaired the enormously influential Committee of the U.S. National Academy of Sciences, which set a course of action for federal support of the chemical sciences. The recommendations of that report were implemented, and it was widely referred to as the Westheimer Report. In 2002, Harvard established the Frank H. Westheimer Medal for scientific excellence in his honor.

Westheimer and his wife, Jeanne, had a very wide circle of friends, drawn from around the world but especially from the academic and intellectual community in the Boston area. Weekend dinners at their home were filled with humor and laughter but also with penetrating analyses and discussions of world events and problems. For four decades, he emphasized the need for strong measures against pollution and global warming and in favor of energy conservation, alternative energy development, and greater support of fundamental research. He encouraged fellow chemists to apply their skills to other disciplines, especially biology and medicine. He pleaded with universities to improve the education of nonscientists by finding new ways to teach science.

Westheimer was universally admired and respected as a person by his students and colleagues, worldwide. He was a very gregarious and social person with a happy family life. His wife of 64 years, Jeanne, passed away in 2001. He is survived by their daughters, Ruth Susan Westheimer, M.D., of Worcester, MA, and Ellen Westheimer of Carlisle, MA.