J. W. Kennedy, Scientist, Teacher, Leader

In the death of Joseph W. Kennedy, on 5 May 1957, the world lost a brilliant scientist, an inspiring teacher, a wise leader, and a warm friend. In addition to his outstanding scientific career, many will remember him for his keen, inquiring mind, his originality, his quick wit and entertaining stories, his persuasive arguments, his integrity, his wisdom, and his kindness.

Kennedy was born in 1916 in Nacogdoches, Texas. He received his A.B. degree from Stephen F. Austin State Teachers College, in 1935, his M.A. degree from the University of Kansas, in 1937, and his Ph.D. degree from the University of California, in 1939. He served as instructor in chemistry at the University of California from 1939 through 1942. In 1943 he organized the Chemistry-Metallurgy Division at the new Los Alamos Laboratory and served as its division leader through 1945. In 1946 he came to Washington University, St. Louis, Missouri, where he served as Eliot professor of chemistry and chairman of the department of chemistry until his death.

His principal research interests were in the field of radiochemistry, but his scientific interests and knowledge extended to all fields of chemistry and physics. His brilliant mind was able quickly to comprehend any subject and to get immediately to the heart of a problem.

Kennedy's first publications (1939) concerned the identification and chemical separation of nuclear isomers. His work led to the identification of the isomers of tellurium-131, tellurium-129, tellurium-127, and zinc-69 and to the understanding of the importance of the internal-conversion process in the chemical separation of nuclear isomers.

His research accomplishments were many, but he is probably best known for the important part he played in the discovery of the element plutonium and the determination of the fission properties of plutonium-239. He not only contributed many of the important ideas for experiments, and their interpretations, but he designed and built the detection instruments that were essential to the work. The thin-window Geiger and proportional counters, the ionization chambers, and the linear amplifiers which Kennedy designed and built were new and novel to radiochemists in 1940 and had much to do with the early success of the Berkeley radiochemistry group.

In 1943 Kennedy was chosen to organize the Chemistry-Metallurgy Division of the new and highly secret Los Alamos Laboratory. The division started with perhaps a dozen scientists and grew to number them in the hundreds, as the magnitude and difficulties of the chemical and metallurgical problems became apparent. Nothing seemed impossible; the only questions concerned the quickest and best approaches to the problems. For these, Kennedy was an inexhaustible source of ideas. He inspired the members of his division to great efforts and had the vision and wisdom to lead them through expansion and building pains, past personnel misunderstandings, and over new and immense technical problems. He took a personal interest in his men and helped many of them find suitable positions after World War II. Kennedy, then only in his twenties, enjoyed the respect and confidence of all the men in his division and of the many others in the laboratory with whom he worked. For his outstanding contribution at Los Alamos he received the U.S. Army Medal of Merit, the highest military award that is bestowed on a civilian.

In 1946, when he came to St. Louis to become chairman of the department of chemistry at Washington University, he brought from Los Alamos a number of his associates to take positions on the chemistry faculty and some to do graduate work in chemistry. His enthusiasm for teaching and research were contagious. New courses and new research projects were started, and these developed into sound undergraduate and graduate programs of study and research.

With his graduate students, Kennedy contributed to a number of branches of radiochemistry. In hot-atom chemistry, the effects of positron decay in the $Mn^{51} \rightarrow Cr^{51}$ transition were studied. In kinetics, the iodine-iodate isotopic exchange reaction was investigated with a thoroughness that is seldom found in kinetic work. He pioneered in quantitative rate measurements of oxygen-18 exchange reactions. He and his students investigated, with care and precision, the kinetics of oxygen exchange between water and sulfuric acid and between water and phosphoric acid.

He made major contributions in the field of self-diffusion of ions in aqueous solution. With his students, he developed new techniques, which were studied and refined until they were proved to be reliable. The self-diffusion of Na^+, K^+, Rb^+, Cs^+, Cl^-, and I^- were studied over wide ranges of concentration.

Kennedy liked best the experiments that were novel and exciting. Shortly after the war he made calculations, planned experiments, and built equipment for the detection of positronium, before its discovery was announced.

He studied bacteriophage containing radioactive phosphorus to learn about the source of phosphorus in the progeny and, from this, perhaps something about the reproductive mechanism.

His most recent work concerned the generation of high potentials by insulated radioactive sources. He had hoped to build a "poor man's accelerator"—a device consisting of a series of beta sources that could attain a potential of approximately 12 Mev. The potential, unfortunately, was limited by vacuum conduction, and the scope of the problem changed to a study of the conduction mechanism. Kennedy believed that if the mechanism were understood, the conduction might be controlled.

Kennedy was an outstanding teacher. He had the rare ability to express himself clearly and concisely and to explain complex concepts in simple and exciting language. His quick wit and wealth of stories added to the interest of his lectures.

He taught, for many years, a graduate course in radiochemistry. For the textbook, he wrote, with Gerhart Friedlander, *Introduction to Radiochemistry,* which they revised in 1955 and published under the title *Nuclear and Radiochemistry.* This contains a wealth of information, presented clearly and logically, and is widely used as a textbook and reference book.

Kennedy enjoyed teaching chemistry to freshman. He liked working with the students and was sympathetic and understanding of their problems. By creating interest in chemistry at the freshman level, he was able to attract promising students to careers in chemistry.

Under Kennedy's wise and inspiring leadership, the department of chemistry at Washington University has grown steadily in stature. Graduates are in

great demand, and students and visitors are attracted from all parts of the United States and from many other parts of the world.

Kennedy served with tireless energy on numerous university committees. His services were also in great demand outside the university. He served as a civilian with the U.S. Office of Scientific Research and Development in 1944 and later served on other governmental committees, including the Atomic Energy Commission's Reactor Safeguard Committee. He was consultant or adviser to the Brookhaven, Los Alamos, and Oak Ridge national laboratories and to the General Atomics Corporation and the Polaroid Corporation.

He was secretary (1952), vice chairman (1953), and chairman (1954) of the Division of Physical and Inorganic Chemistry of the American Chemical Society. In 1952 he gave the Priestley lectures, on "Radioactive atoms and isotopic tracers," at Pennsylvania State University.

Something of Kennedy's courage and his faith in science is shown by his last scientific effort—a search for a cure for cancer, the disease which took his life. After reviewing the many approaches that were being followed, he concluded that a very promising but neglected one was the destruction of cancer cells by the $B^{10}(n,\alpha)Li^7$ reaction. He believed that boron compounds could be found that would be selectively absorbed, as are some amino acids, by cancer cells, which could then be destroyed by neutron irradiation. His last experiments were attempts to synthesize such compounds. These experiments are being continued by two of his former colleagues, under a grant which he helped to arrange.

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News of Science

German Scientists Not Required to Work on Nuclear Weapons

Chancellor Konrad Adenauer of West Germany reversed his point of view a few days after he had criticized 18 of his country's nuclear physicists who had stated on 12 Apr. that they would refuse to work on atomic weapons [*Science* **125**, 876 (3 May 1957)]. Adenauer joined with Defense Minister Franz-Josef Strauss, NATO Commander Hans Speidel, and other high officials of the West German Government in an all-day conference with five of the scientists who had signed a public protest—Otto Hahn, Max von Laue, Carl-Friedrich von Weizsäcker, Walther Gerlach, and Wolfgang Reizler.

The conference resulted in a joint communique that included the following statements:

"The Federal Chancellor and the gentlemen of science who took part in the discussion believe it is necessary to appeal to all Governments, East and West, with all available means in order to achieve an agreement on a general controlled disarmament that might liberate the people of the world from the fear of an atomic war. . . .

"It was clarified that the Federal Republic now as before will not produce its own atomic weapons and therefore the Federal Government sees no cause to request German nuclear scientists to participate in the development of these weapons."

Nuclear Clock at Brussels World's Fair

The $5-million United States Pavilion for the 1958 Brussels World's Fair was dedicated recently. Concurrent with the dedication ceremony was the installation of a nuclear clock that will measure time through the disintegration of radioactive substances, radium-226 and tantalum-182. The instrument is set for the 6 months of the fair, which will run from 17 Apr. 1958 through 19 Oct. 1958. The nuclear timepiece, symbolizing this country's atoms-for-peace program, was demonstrated by T. O. Jones, acting coordinator of the science program for the American exhibition.

Asian Flu

A mild outbreak of influenza, believed to be of the Far East type, has been reported by the Navy on ships of the Atlantic fleet stationed in Newport, R.I. There were an estimated 550 cases on eight of 110 ships. The cases are usually mild, but the virus appears to be highly contagious.

The United States Public Health Service has announced that a new monovalent vaccine is currently being tested on 60 volunteers in Montgomery, Ala. The U.S. Department of Defense has placed an order for 4 million injections for the armed forces if the experimental vaccine proves effective.

News Briefs

The Vanguard Computing Center, where high-speed electronic calculations will predict future orbits of U.S. earth satellites, opened on 2 July in Washington, D.C. The center will be operated under a Navy contract by International Business Machines Corporation.

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Tadayoshi Doke, assistant professor at St. Paul's University, Tokyo, reported recently that radioactive contamination over Japan had increased by 12½ times in the last 2 years.

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The Soviet news agency Tass reports that the Soviet Union has built a large hydrological laboratory at Valdai, near the source of the Volga River.

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A radio observatory that will keep a constant record of disturbances on the sun's surface during the International Geophysical Year was dedicated on 30 June at the Rensselaer Polytechnic Institute.

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A new corporation, NDA Europe, has been formed in Brussels by Belgium and United States interests to provide for rapid atomic energy development in the six Euratom countries and their colonies, possessions, and territories. The principal owners of the new corporation are Nuclear Development Corporation of America, White Plains, N.Y., and Société Générale des Minerais, Brussels.

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The School of Medicine of the University of Missouri has been fully accredited by the Council on Medical Education of the American Medical Association as a complete 4-year school and voted full membership in the Association of American Medical Colleges.

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The Muscular Dystrophy Associations of America, Inc., has announced plans to erect a $3.5-million research laboratory and office building in New York.