versities, the petroleum industry, and the Illinois and US Geological Survey. His research interests include the physics of underground fluids—important to the exploration for and production of oil and gas—and the physics of deformation as it applies to the Earth's crust.

obituaries

Mark W. Zemansky

On 29 December 1981, Mark Waldo Zemansky, professor emeritus of physics at the City College of New York, died at the age of 81. We would be hard put to think of any teacher or writer of textbooks who had a greater influence on physics in North America than Mark Zemansky; his contributions to research take second place only to his profound achievements as an educator.

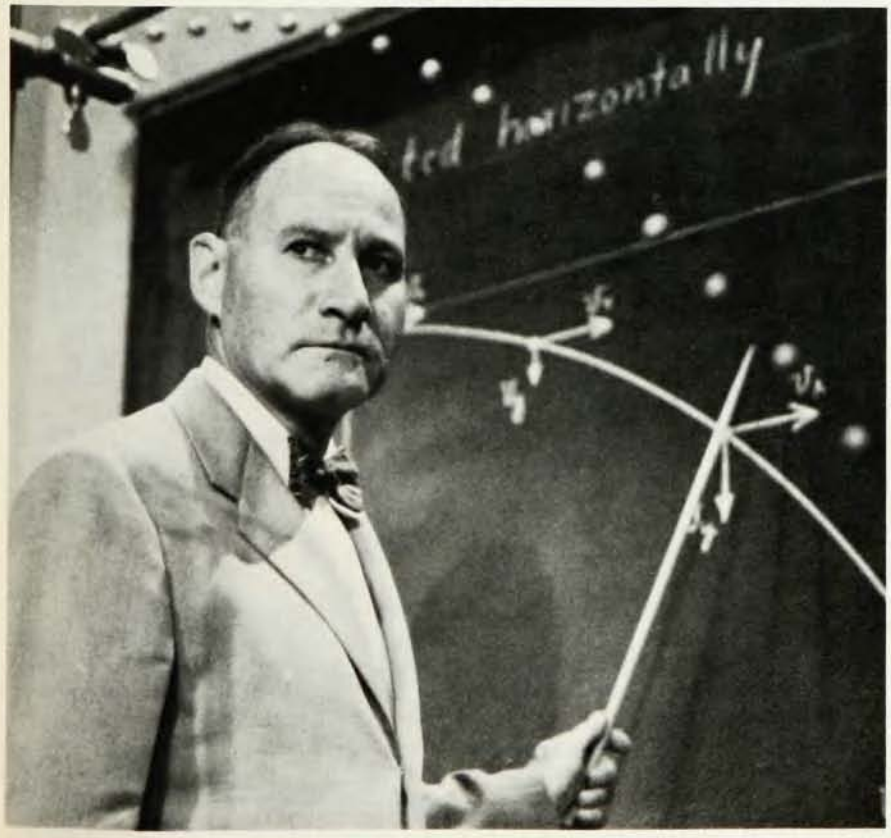
Born in New York City in 1900, Zemansky graduated from CCNY in 1921 and received his PhD degree from Columbia University in 1927. In 1925 he joined the faculty of City College, where he remained until 1967. He was a National Research Council fellow, first at Princeton University from 1928 to 1930 and then at the Kaiser Wilhelm Institute in Berlin from 1930 until 1931. The research he conducted during that time, in radiation and collision processes of gaseous atoms, led, *inter alia*, to the book *Resonance Radiation and Excited Atoms* (1934) written in collaboration with A. C. G. Mitchell. Owing to the enhanced interest in resonance phenomena occasioned by the invention of the laser and the discovery of the Mössbauer effect, the book was reprinted in 1961.

Between his return to CCNY from Berlin and his retirement in 1967 Zemansky left the College only for a trip around the world in 1936 and for war work in 1943–44. As chairman of the CCNY physics department from 1956 to 1959, he led it into the modern era and from 1963 to 1966 was the first executive officer of the City University's new doctoral program in physics.

In 1937 Zemansky's world-famous book *Heat and Thermodynamics* was published. It is now in its sixth edition with Richard H. Dittman as co-author. In 1947 Francis W. Sears and Zemansky published the first edition of *College Physics*. In 1949 their *University Physics* followed. These textbooks, for well over two decades and through six editions—the latest written with Hugh D. Young—dominated the market in their field. Zemansky also wrote *Temperatures Very Low and Very High* and contributed to the *American Institute of Physics Handbook*.

From 1946 to 1956, Zemansky was associated with the cryogenics labora-

ZEMANSKY



tory of Columbia University, where he collaborated with Henry Boorse on the measurement of heat capacities of superconducting metals and other researches.

During his long association with the American Association of Physics Teachers he was associate editor of the *American Journal of Physics* from 1941 to 1947, president of the Association in 1951 and, from his retirement from CCNY until 1970, executive secretary.

Mark's former students and colleagues at CCNY remember him as an inspiring and irreplaceable teacher and friend, who had a profound, determining influence on their lives and achievements. Literally hundreds of well-known (and thousands of not so well-known) scientists, engineers and other professionals passed through Mark's hands at City College, among them physicists Benjamin Bederson, Sidney Borowitz, Lawrence Cranberg, Gregory Dash, Bernard Feld, Herman Feshbach, Edward Gerjuoy, Robert Gluckstern, Herbert Goldstein, Morton Hamermesh, William Havens, Robert Herman, Robert Hofstadter, Leon Lederman, William Nierenberg, Arno Penzias, Frank Press, Julian Schwinger, Gary Steigman and Leonard Susskind.

Recipient of the 1956 Oersted Medal, he was a marvelous lecturer and—although possessed of deep and secure knowledge in most areas of physics—was totally unassuming and eager to learn new ideas and developments from his junior colleagues. While he was a hard taskmaster who suffered neither sloth nor folly gladly, he was also a kind and helpful mentor and friend. His door was always open to students at a time when sixteen hours per week was his and everyone else's normal teaching load. How he prepared and taught his classes, helped his students, did his research, wrote his books and made his contributions to the AAPT, all at the same time and all so well, was something that his colleagues found hard to understand even at the time and that his successors find incomprehensible today.

ROBERT HOFSTADTER
Stanford University
HARRY LUSTIG
HENRY SEMAT (EMERITUS)
The City College of the City University of New York

Arthur M. Bueche

Arthur M. Bueche, senior vice president of corporate technology for the General Electric Company, died 22 October 1981 in Bridgeport, Connecticut. He was a graduate of the University of Michigan in 1943, attended Ohio State University and received his doctorate in physical chemistry from Cornell University in 1947. He joined General Electric in 1950 and began a distinguished career that carried him to the front ranks of the nation's scientific and technological leaders.

BUECHE

When GE's corporate Research and Development Center was formed in 1965 through the merger of the company's research and engineering laboratories in Schenectady, Art Bueche became its first director. One of his finest achievements was demonstrating that it was possible for such an industrial organization to achieve a critical balance in its activities: helping the company's operations to overcome near-term technical challenges while sponsoring longer-range research that resulted in new ideas and new opportunities.

Bueche's success as a research director was recognized worldwide. As a member of the national academies of sciences and of engineering, as the president of the Industrial Research Institute, as co-chairman of President-elect Reagan's advisory task force on science and technology, and in the innumerable other professional, governmental, academic, and industrial activities of his career, he displayed an unflagging dedication to science and technology and to their effective contributions to our society.

At the time of Art's death, I was visiting the Stanford Medical Center on a trip that he had suggested. Stanford had just succeeded in making clear pictures of arteries *in vivo*, using computed-tomography and dual-energy x rays. Ironically, one goal of this experimental diagnostic technique is to detect and make possible surgical correction of just those incipient conditions that had caused his heart attack. Art himself had formed the team that developed the advanced computed-tomography scanner used at Stanford.

This achievement in computed tomography is only one of many industrial successes that resulted from Bueche's career as a manager and director of industrial R&D. Others include Noryl resin, an engineering plastic based on polyphenylene oxide chemistry; charge-injection-device solid-state cameras; polycrystalline cutting tools fabricated from synthetic diamond and cubic boron nitride (a synthetic material second in hardness only to diamond); a unique, high-efficiency phosphor for fluorescent lamps; and surface charge-transfer devices from analog signal processing, to name just a few of the many examples that might be cited.

Bueche's instincts as a research director were superb. "What is the new, unique idea or discovery?" "Who is the advocate?" and "Why not faster?" were not just questions for him. The answers nourished him, and, unless he felt comfortable about those answers, he was as restless as a caged bear. Presenting information to him could be like feeding a bear; he was so ravenous for ideas that he could intimidate the timid or uncertain bearer. In the balance of traits—between enthusiasm and analysis, between advocacy and criticality, between intuition and logic—Bueche was not one of steady, placid equilibrium. Instead, he had all of these traits, strongly, in a dynamic interaction that made him a stimulating, challenging man with whom to work.

In the final analysis, Bueche cared—and cared deeply—about success for the organization he ran, the company for which he worked, the institutions to which he belonged, and his country. He contributed to all of these sectors: new organizational concepts and methods of planning and managing R&D; new products, processes and businesses; new activities and leadership for entities such as the Industrial Research Institute; and missionary zeal in spreading an understanding of the nation's challenges in science and technology.

R. W. SCHMITT
Research and Development
General Electric Company
Schenectady

Hans H. Staub

Hans Staub, born in 1908, was educated in his native Switzerland. At the age of 25 he received the doctor's degree of the Federal Institute of Technology in Zurich, where he stayed four more years as an assistant of Paul Scherrer. In line with Scherrer's then-prevailing inter-