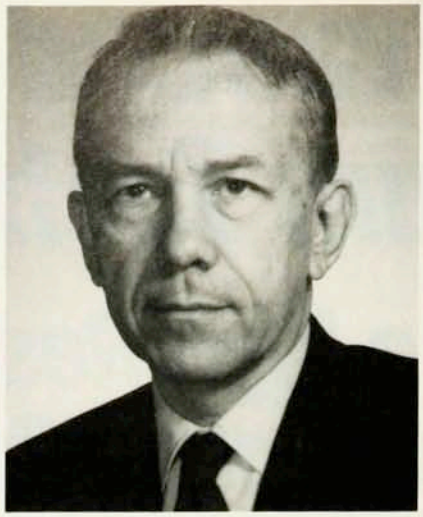

BIOT

aeronautical patents.

As an applied mathematician and physicist, Biot was a master of variational techniques, operational methods and numerical approximations. He had the rare talent of taking seemingly complex problems, finding the essential concepts and coming up with invariably useful, and frequently brilliantly simple, theories. One thinks in particular of:

▶ His elegant work on elasticity and stability problems in prestressed elastic and viscoelastic media, begun in the 1930s and culminating in 1965 with a monograph entitled *Mechanics of Incremental Deformation.* This monograph gave, among other things, the details of a powerful and original method for treating the onset of folding in layered geologic structures.

▶ His theory of wave propagation in fluid-saturated porous elastic solids. Published almost 30 years ago in the *Journal of the Acoustical Society of America,* it has in the last ten years or so proved enormously valuable in describing quantitatively the damping of oceanic sound waves interacting with bottom sediments.

▶ His variational treatment of heat-transfer and irreversible-thermodynamics problems, which resulted in two recent monographs.

Biot published close to 200 research articles and books on elasticity theory, thermodynamics, applied mathematics, soil mechanics, wave propagation and scatter, wing flutter, geophysics and seismology. In these times of extreme specialization such breadth of competence is, to say the least, uncommon. Equally unusual was his ability to produce so much first-rate research while working outside the academic establishment, without students and essentially alone. His was a great and unique talent.

Biot's friends will long remember him as a brilliant conversationalist, an amusing and articulate polemicist interested in all the great technical, social and political issues of our turbulent era. It was my great privilege to have been his friend for many years.

IVAN TOLSTOY
Knockvennie, Castle Douglas, SW Scotland

Frank Harold Spedding

Frank Harold Spedding, professor emeritus at Iowa State University and founder and director emeritus of the Ames Laboratory of the US Department of Energy, died on 15 December 1984 in Ames, Iowa, at the age of 82.

Spedding was born on 22 October 1902 in Hamilton, Ontario, Canada. He moved to the United States with his family a month later, and became a naturalized US citizen through his father. He received his MS from the University of Michigan in 1926 and his PhD in chemistry from the University of California at Berkeley in 1929. He remained at the University of California as an instructor of chemistry (1929–30 and 1932–34) and as a National Research Council fellow (1930–32). In 1935 he went to Cornell University as George Fisher Baker Assistant Professor. Spedding joined the Iowa State University faculty as associate professor of chemistry in 1937, advancing to professor of chemistry in 1941. He was additionally named professor of physics (1950), professor of metallurgy (1962, in what is now the department of materials science and engineering) and Distinguished Professor of Sciences and Humanities (1957). Spedding served as director both of the Iowa State atomic project (1942–47) and of the Institute for Atomic Research (1945–68). He was director of the Ames Laboratory of the US Atomic Energy Commission (now of DOE) from its inception in 1947 to his retirement from administrative duties in 1968. Spedding formally retired as a professor in 1973, becoming professor emeritus at that time.

Spedding was an internationally recognized expert on the rare-earth and related elements, initially pioneering crystal-field spectroscopy with these elements and eventually extending his contributions to all aspects of their chemistry, physics and metallurgy. His major accomplishments in this area included the separation of the pure rare earths on a large scale by displacement ion-exchange chromatography and the preparation of all of the pure rare-earth metals, also on a large scale. This led to a burgeoning worldwide use of these elements, both for research and for application, stimulated in many cases by ultrapure and excellently characterized samples furnished by Spedding's laboratory. Re-

search consequences of this use included a revolution in the conceptual framework of the theory of magnetic materials.

Because of his expertise in rare-earth chemistry, Spedding was asked by Arthur H. Compton (then director of the metallurgical laboratory of the University of Chicago) to develop a process for making pure uranium metal for the national atomic-bomb effort. In collaboration with H. A. Wilhelm (then an assistant professor of chemistry at Iowa State and the local expert in metallurgy, and subsequently professor of chemistry and metallurgy and associate director of the Ames Laboratory until his retirement in 1972), he invented processes for making both pure uranium and pure thorium metals, and supervised the production of over a million pounds of each on the Iowa State campus during World War II. The largest source of uranium for the first chain-reacting pile was the Iowa State project.

Because of these accomplishments, Iowa State University was selected as the site for a national laboratory of the Atomic Energy Commission, and the Ames Laboratory was established as a government-owned, contractor-operated laboratory of AEC, with Iowa State chosen as operating contractor and with Spedding chosen as director. This laboratory has had a tremendous impact on the university, very largely because of Spedding's ability to implement his vision of a laboratory emphasizing basic research of a character suitable for faculty and graduate-student participation, but sufficiently focused to have impact on and relevance to problems likely to arise in future technologies. The Ames Laboratory continues to be a major DOE center for research in the preparation, characterization, property evaluation and interpretation of advanced materials consistent with this original vision. Spedding's perpetual curiosity, enthusiasm and dedication were an inspiration to all who knew and worked with him.

ROBERT S. HANSEN
Ames Laboratory
Iowa State University
Ames, Iowa

William Peter Hesse

William Peter Hesse, chairman of the physics department of Randolph–Macon College, died in West Germany on 3 August 1985. He had been struck by a passing car while helping a disabled motorist and died of his injuries during surgery at a local hospital.

Born on 28 June 1942 in Binghamton, New York, Hesse received his PhD in 1971 from the University of California, Santa Barbara. He taught physics