ARThUR M. SQUIRES
1916–2012

Elected in 1977

“For contributions to the research and understanding of coal gasification and the recovery of organic chemicals from coal.

SUBMITTED BY THE NAE HOME SECRETARY
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RTHUR M. SQUIRES, University Distinguished Professor (emeritus), Virginia Polytechnic Institute and State University, died on Friday, May 18, 2012, at his home in Blacksburg, Virginia, after a long illness. He had served industry 25 years as a chemical engineer: in the first four participating in design, construction, and start-up of the Manhattan Project’s gaseous diffusion plant at Oak Ridge, Tennessee; in the remainder focusing primarily on fossil fuel technologies. He then spent 19 years on chemical engineering faculties at the City College of New York and Virginia Tech. He also sang professionally with the New York Pro Musica Antiqua for nearly 20 years.

Arthur Squires was born in Neodesha, Kansas, on March 21, 1916, the third son and fourth child of Charles Loren and Vera Moore Squires. He attended elementary and high school in Higginsville and Columbia, Missouri, respectively, and in 1938 the University of Missouri granted him an AB with distinction in chemistry. In 1947 he completed a PhD in physical chemistry under John Kirkwood at Cornell University.

During World War II Squires was a chemical engineer on the Manhattan Project. Under the mentorship of Manson Benedict, he participated in the design and construction of K-25, the gaseous diffusion plant at Oak Ridge, where fissionable material for the first atomic bomb was produced,
by enriching U-235 from 0.7 percent in natural uranium to higher concentrations. Although Squires rarely talked about this period of his life, family members recall that he said he traveled back and forth between Oak Ridge and New York City with his briefcase handcuffed to his wrist.

After the war Squires advised Union Carbide Co. (K-25’s operator) and the US Army about what levels of concentration of U-235 would be sensible for a partial K-25 plant to ship and in what amounts. He helped Carbide organize a process analysis department, and with Cuthbert Daniel instituted a statistically controlled material balance. This work became important in supporting a decision to increase the concentration level in K-25’s product from 35 percent to 90 percent (bomb grade) without danger of accumulating a critical mass of U-235 and creating a nuclear chain reaction in the K-25 high-end equipment. Consequently the Army was able to stop using the more expensive electromagnetic separation to carry K-25’s product to bomb level.

But in 1950, during visits to other nuclear sites operated by the Atomic Energy Commission, Squires learned that none was conducting a material balance of its dangerous fissionable material under even remotely comparable statistical control. Believing nuclear electricity would be too dangerous for the often careless, forgetful human animal to use and that nuclear technology’s only viable applications would be military, he left the field.

A major focus of the next 21 years of service to industry (the last 8 as a self-employed consultant) was in technologies related to fossil fuels. He then served on the chemical engineering faculties of the City College of New York (9 years) and Virginia Tech (10 years), where his research related to control of emissions from the use of coal. He remained active on this topic until his death, having filed for three patents in the past year.

His contributions were recognized in his election to the National Academy of Engineering, and he was a fellow of the American Academy of Arts and Sciences and the American Association for the Advancement of Science.
Puzzled by the several major, expensive failures of United States governmental efforts to advance technology after WWII, Squires became interested in management. In his 1986 book *The Tender Ship*, he developed criteria for recognizing good and bad governmental management of technological change. This book received favorable reviews in both *Nature* and *New Scientist*.

Dr. Squires enjoyed life to the fullest and was a highly informed enthusiast of the performing and visual arts, attending concerts, opera, dance, theater, and exhibitions throughout his life and around the world. A trained and accomplished tenor, he was perhaps most involved with music. In late 1946, he joined the Cantata Singers, a choral group led by Bach scholar Arthur Mendel. In 1950 he also joined the (David) Randolph Singers, and in 1953 he became a founding member of Noah Greenberg’s Pro Musica Antiqua, singing and playing the viola da gamba with this group well into the 1960s and performing in two medieval liturgical plays, *The Play of Daniel* and *The Play of Herod*, for which the ensemble was perhaps best known. He also built and played one of the first kit harpsichords.

He was an avid collector of art, with special interests in Yoshi Toshi woodcuts, Walter Clark landscape sketches, and George Rickey mobiles, among many others. He had recently grown to love and support the American Shakespeare Center and Blackfriars Playhouse in Staunton, Virginia.

Always an avid reader of anthropological literature, Squires became curious about human evolution and devoted a number of years to its serious study. A member of the Human Behavior and Evolution Society and the International Society for Human Ethology, he presented papers at meetings of both societies. In 2011 he published a short book titled *From Toumai to G. Stein and O. Wilde*, an unconventional story of hominin evolution. At his death he left a manuscript in progress, “The left hand of love,” which offers a more detailed account of human evolution.

Dr. Squires is survived by his partner and loving companion John Jussi Korzeniowski, and will also be much missed by his many nieces and nephews and their extended families: Shirley
Wilhelm Jondro, Carlyle, Illinois; Conrad Squires, Nahant, Massachusetts; Jenny Wilker, Asheville, North Carolina; Robert Andrew Squires, Berlin, Vermont; Mary Ann Grassit, Everett, Washington; Beverley McKeeman, Simsbury, Connecticut; Donald Squires, Boston; Michael Squires, Los Angeles; David Bess, New Orleans; William Bess, Albuquerque; and Gordon Bess, Fenton, Missouri.