



Hayden A. Murray

HAYDN H. MURRAY

1924–2015

Elected in 2003

“For pioneering work on the mineralogy and industrial applications of clays.”

BY JESSICA ELZEA KOGEL
SUBMITTED BY THE NAE HOME SECRETARY

HAYDN HERBERT MURRAY, renowned scientist, educator, and pioneer in the field of applied clay mineralogy, died February 4, 2015, at the age of 90. He was recognized internationally as the foremost expert in the world on applied clay mineralogy, and was without peer in his knowledge of clay mineral deposits worldwide.

His work on the mineralogical structure of various clay types, particularly in the kaolin family of clays, was the precursor to current mineral processing and chemical treatment practices. His leadership in applied clay mineralogy led to four US patents and the development of innovative kaolin products for paper coating and filling, enhanced single coat coverage in paints, and expanded uses for clays in ceramics and plastics as well as other commercial applications.

As an educator he turned out graduates who became industry leaders working in virtually every corner of the world, from the United States to Brazil, China, New Zealand, Germany, and numerous other locales.

Haydn Murray was born August 31, 1924, in Kewanee, Illinois, where he grew up, and attended high school in nearby Toulon. Upon graduation in 1943 he enrolled at the University of Minnesota, but in his first year joined the US Army. He served from 1943 to 1946, the latter two years as a

first lieutenant with an engineering aviation battalion in the Pacific. Before being shipped overseas he married his high school sweetheart, Juanita Ara Appenheimer, in 1944.

After his discharge from the Army he enrolled in the University of Illinois, where he earned his BS, MS, and PhD degrees in geology, the latter in 1951. His doctoral dissertation, "The Structure of Kaolinite and Its Relation to Acid Treatment," set the stage for the more than 200 peer-reviewed papers he authored over his career.

Upon receipt of his PhD he joined the faculty at Indiana University, accepting a joint position that included responsibilities with the Indiana Geological Survey. During his first year of teaching he became involved with the newly formed Clay Minerals Committee, which was supported by the National Academy of Sciences and the National Research Council. It was from this group that the Clay Minerals Society came into being, with Dr. Murray as one of the founding members. Since its formation the society has been the preeminent technical organization for the global clay mineralogy community.

In 1957 he resigned his positions at Indiana University and the Indiana Geological Survey to become director of research for Georgia Kaolin Company. He was attracted to the company as an opportunity to apply his research on factors influencing high solids kaolin slurries.

At Georgia Kaolin he assembled a team of select scientists and focused on developing new commercial applications for kaolin and related clay minerals. His work was of such significance that by 1961 he had been promoted to manager of operations, in 1963 vice president of operations, and in 1964 he became executive vice president and chief operating officer.

Under his leadership the company expanded into bentonite clay with the acquisition of Benton Clay Company (Casper, Wyoming). Further company growth and expansion came with the acquisitions of Southern Clay Products (Gonzales, Texas); New Zealand China Clays (Maungapareua); and a joint venture with Amberger Kaolin (Herschau, Germany). These acquisitions took the company into the production and application of sodium and calcium bentonites, halloysite, and

European kaolins. Dr. Murray also examined clay deposits in Australia, Indonesia, Africa, Brazil, and Mexico.

In 1973 he returned to Indiana University as head of the Geology Department, a position he held until he left in 1994. While there he created the only academic program in applied clay science in the United States. Over the years his students completed research and theses in multiple countries and on clays as diverse as kaolin, bentonite, halloysite, and palygorskite. His 68 PhD and MS students, along with many postdoctoral students, have gone on to occupy critical positions in industry, government, and academia throughout the world.

Dr. Murray's influence and reputation were such that in 1973 he was called to chair the UNESCO Kaolin Genesis Committee, which sponsored field excursions and conferences to study and report on a wide variety of global kaolin deposits. In 1984 the US State Department's Agency for International Development (AID) engaged him to evaluate clay deposits in Egypt, and in 1985 the Geologic Survey of Chile asked him to evaluate several Chilean industrial minerals operations.

In 1994 he left teaching and formed H.H. Murray and Associates to focus on research in applied clay mineralogy. He and the firm were called on for assignments in kaolinites in Argentina, Australia, Brazil, Canada, and China; bentonites in Argentina, Germany, Great Britain, Italy, and the United States; and palygorskites in China, Senegal, and the United States.

Dr. Murray received numerous accolades and awards and served in a variety of professional capacities. He was the recipient of the Hardinge Award in Industrial Minerals from the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME; 1976); Marilyn and Sturges W. Bailey Distinguished Member Award from the Clay Minerals Society (1980), which also selected him as its Pioneer in Clay Science Lecturer (2009); and University of Illinois Department of Geology Alumni Achievement Award (2004).

In addition to his election to the NAE, he was recognized as a distinguished member of the Society for Mining, Metallurgy,

and Exploration (SME; 1975) and honorary member of the AIME (2014). He served as president of the Clay Minerals Society (1965–1966), SME (1988), American Institute of Professional Geologists (1991), and Association Internationale pour l'Étude des Argiles (1993–1997). He received an honorary doctor of science degree from the University of Buenos Aires (2000).

In 2001 Haydn and Juanita established the Murray Chair of Applied Clay Minerals at Indiana University. He continued his research and field studies until his health no longer permitted. This work included continued involvement in the study and development of a large palygorskite deposit in China, exploration for bauxite in Brazil and Suriname, and his ongoing research on Georgia kaolins, their environment of deposition, and the effects of postdepositional alteration. His two-volume book *Applied Clay Mineralogy* (Elsevier Science, 2006, 2007) was the capstone publication of his career and remains a valued reference for researchers, exploration geologists, and mine operators.

Dr. Haydn Murray was a kind, generous, and humble person. He selflessly supported students, colleagues, and friends by giving freely of his time, expertise, and friendship, even as, throughout his active and successful professional life, his family remained his principal focus. He and Juanita traveled extensively during his career. He also enjoyed golfing, family reunions, card games, reading, fishing, and hunting.

He is survived by Juanita; daughters Marilyn Elder (Andy) of Zionsville, Indiana, and Lisa Rotskoff (Peter) of Springfield, Illinois; grandchildren Samantha Murray, Reed Elder, Blake Elder (Melissa), Case Elder, and Grant Rotskoff; and great-grandchildren Haydn Murray, Zane Murray, Madison Elder, and Shelby Murray. He was predeceased by his son Steven Murray and grandson Mark Murray.

