



F. Deays Richards

FREDERICK DENYS RICHARDSON

1913-1983

BY MICHAEL TENENBAUM

FREDERICK DENYS RICHARDSON, elected in 1976 as a Foreign Associate of the National Academy of Engineering (NAE), died on September 8, 1983. He was Emeritus Professor of Extraction Metallurgy at the Imperial College of Science and Technology. His death has been described by one of his peers as the passing of “the last of the four apostles of Chemical Metallurgy.” This group—Denys Richardson, John Chipman, Carl Wagner, and Lawrence Darken—shaped the field of chemical metallurgy into an exact and rigorous science. In his lifetime Professor Richardson became recognized for his scientific and practical mind, as well as his unique ability to generate basic data and to apply such fundamental knowledge to large-scale industrial systems.

Denys Richardson (his friends generally omitted the “Frederick”) was born in London, England, on September 17, 1913. He was orphaned at the age of six with two older brothers and one younger sister. He received his early education at a small, independent, boys’ boarding school. What this small school lacked in size it made up in its work-ethic beliefs. Its teaching schedule started with a preparatory session before breakfast and then proceeded through a day-long rigorous academic program. During holidays students were exposed to more practical activities, ranging from carpentry to nature works, with ample time devoted to encouraging hobbies. Throughout his busy career Denys Richardson exploited this early training by using his wonderful mind not only to generate new knowledge, but also to work creatively with his hands.

He received his B.Sc. (chemistry) in 1933, his Ph.D. in 1936 from University College, and his D.Sc. (metallurgy) in 1955 from London University. In 1937 he went to America as a Commonwealth Fellow, and returned to England shortly before the outbreak of World War II. Shortly after his return he entered the Royal Naval Volunteer Reserve, and in 1943 he became Deputy Director of the Department of Miscellaneous Weapons Development, Admiralty England. Among other things, it was here that he contributed notably to the development of countermeasures to the magnetic mines that were infesting the waters surrounding the British Isles. His work in the Admiralty concerned the degaussing of ships and the sweeping of magnetic mines. He also invented the two-pounder star shell used by the British Coastal Command. He rose to the rank of Commander in the Royal Navy Voluntary Reserve (RNVR). His co-workers in the Royal Navy describe the "cheerfully unorthodox style, with which he tackled difficult problems connected with the war at sea, as almost legendary."

Denys Richardson's achievements in the Admiralty brought him scientific recognition which, after the war, led to his selection to join the newly established British Iron and Steel Research Association (BISRA). At BISRA he supervised the development of an outstanding chemistry department. In 1950 he made the permanent transition to academia by accepting the post of Nuffield Fellow at Imperial College. In 1957 he was appointed Professor of Extraction Metallurgy, a chair that he occupied for more than twenty years. It was during this period that he formed the John Percy Group in Process Metallurgy with support from industry and the Nuffield Foundation. He retired in 1976 but remained very active in the posts of Senior Research Fellow and Emeritus Professor of Extraction Metallurgy.

Throughout his teaching career Professor Richardson dedicated himself to seeking out promising students with inquiring minds and took pride in his ability to help them fulfill their potential. He was an inspiring teacher to those who were fortunate enough to hear his lectures or collaborate in his research. He would say, "Give me a student who asks questions-not one with his head crammed with second hand information." He obtained great satisfaction when the

steady flow of young men emerging from his classroom occupied important posts in academic institutions and leadership positions in industries all over the world.

Professor Richardson published extensively in the field of chemical metallurgy, contributing basic information on thermodynamic properties of metals and slag solutions, explaining the thermodynamic aspects that control large-scale smelting and refining processes, clarifying the factors that govern the kinetics of gas-metal reactions, and identifying the characteristics that influence mass transfer in high-temperature metallurgical processes. His classic two-volume work, *The Physical Chemistry of Melts in Metallurgy*, published in 1974, is regarded as a standard text on the subject. These volumes, along with many of his 125 or so major technical papers, are outstanding references for those engaged in high-temperature metallurgical chemistry research, development, and teaching.

In his lifetime, Professor Richardson received special recognition from learned societies and institutions in Great Britain, the United States, France, Germany, Austria, Belgium, and Japan. In addition to his election as a Foreign Associate of the NAE in 1976, he was a Charter Fellow of the American Institute of Mining and Metallurgical Engineers; Fellow of the Royal Society, London; Fellow of the Metals Society, London; Fellow of the Institute of Mining and Metallurgy, London; Fellow of the Institution of Chemical Engineers, London; Fellow of University College, London; and Fellow of the Fellowship of Engineering, London.

Other awards received were the Sir George Bielby Memorial Award from the Royal Institute of Chemistry and Society of Chemical Industry; the Bessemer Gold Medal Award from the Iron and Steel Institute, London; the Gold Medal from the Institute of Mining and Metallurgy, London; the Gold Medal from the American Society of Metals; the Peter Tunner Medal from Eisenhutten Oesterreich, Austria; the Grande Medaille from Société Française de Métallurgie; and the Carl Lueg Medal from Verein Deutsche Eisenhüttenleute. He was an Honorary Member of the Japan Institute of Metals, an Honorary Doctor of the Université de Liège in Belgium, and received the Dr. Ing. h.c. from the R. W. Technische Hochschule in Germany.

Shortly before his death, Denys Richardson was awarded the Kelvin Medal for application of science to industry. He was the first metallurgist to receive this great honor.

It might seem from his many accomplishments that Denys Richardson was preoccupied with research and teaching, but the opposite is true. He had a great love for beautiful objects, which he not only admired but also created. He was an ardent gardener, and those of us who were fortunate enough to visit his home derived great pleasure from the results of his aesthetic talents. He shared his warmth, charm, humor, and love with a gracious wife, Irene, and two sons, Hugh and Rodney, each of whom reflect his wonderful disposition, intelligence, and quick wit. His wife describes him fondly as an "exceptionally clearheaded person with a keen and observant eye, who could concentrate exclusively on the work before him, as the surrounding tumult passed over his head." He took great pains over details and pruned and pruned again whatever he wrote. His speeches were always carefully timed. Yet within this rigid framework he could flash out a quip or a play on words that delighted his audiences. His colleagues admired him for his brilliance, and his family loved him for being the wonderful husband and father they were so fortunate to share with all of us.

His death creates a void in the field of metallurgical chemistry. But a great tribute to this man will be the ongoing contributions to the understanding of chemical metallurgy that will be made by the students and colleagues who have benefited from the scientific foundation that was his legacy to them. His reward would be the satisfaction of knowing that the generation he guided and inspired has demonstrated some measure of the rare vision and talent that was Frederick Denys Richardson.

