

IAN TEMPLETON, FRSC

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**J. Sydney Dugdale**  
**1922-2005**



J.S. (Sydney) Dugdale died in hospital in Edinburgh, Scotland, on October 30, 2005, from bronchial pneumonia following a severe urinary tract infection. He was 83.

Sydney was born on February 10, 1922 in Settle, England, the youngest of three brothers. Settle is a small market town in what is now North Yorkshire, formerly the West Riding. It lies on one of the main trans-Pennine routes, on the west side of the picturesque area known as the Yorkshire Dales, in central North England. Adjacent to Settle to the west lies Giggleswick School, a venerable and prestigious establishment founded in 1512. It is what is known in England as a “public” school, meaning, in fact, a private, upper-class fee-paying school, usually mainly for boarders.

Even at 10 years of age, Sydney showed sufficient academic promise that he was awarded a County Minor Scholarship to Giggleswick, which he attended as a day-pupil from 1932 to 1940. In his final year he was appointed Head Boy. This was a rare honour for a day-boys at a public school, who often found themselves isolated between two groups - their former, local friends and the boarders. While at Giggleswick, Sydney had the good fortune to be taught Physics by G.R. Noakes, the author of several classic texts on elementary Physics that are probably still in use today.

Sydney’s schooldays ended in 1940, about a year after the start of WWII. However, having won a County Major Scholarship he was allowed to go up to Jesus College, Oxford for two years before joining the R.A.F. as a Radar Officer for four years, seeing service after D-day in France and Germany. Returning to Oxford in 1946, he graduated two years later with First Class Honours in Physics. At this point he was accepted as a research student by Professor F.E. (later Sir Francis) Simon at the Clarendon Laboratory, where he was introduced to the study of materials at very low temperatures, which became a major area of interest for the rest of his life.

Working at liquid helium temperatures ( $-269\text{ C}$  or  $4\text{ K}$  (Absolute)) at the Clarendon Laboratory in those days was no simple operation, as there was no on-site helium liquefier. Instead, it was necessary to use a technique devised by Professor Simon himself. One’s experimental chamber, filled with high-pressure helium from a storage cylinder, was pre-cooled with pumped liquid hydrogen. The helium gas was then allowed to bleed out slowly, lowering its temperature by “expansion cooling” until by the time atmospheric pressure was reached the vessel was left about half full of liquid helium at  $4.2\text{ K}$ . Further cooling to  $1\text{ K}$  was achieved by reducing the pressure over this liquid with a vacuum-pump. Once the appropriate temperature had been achieved, Sydney’s thesis experiments to determine the melting curve of solid helium then consisted essentially in passing helium gas through a fine capillary tube immersed in the liquid helium at a set temperature while increasing the pressure, and noting the pressure at which blocking of the flow, due to solidification, occurred.

While at the Clarendon, Sydney met another of Simon’s protégés, D.K.C. (Keith) MacDonald, a lively Scots lecturer & researcher. In 1951, MacDonald was invited by Gerhard Herzberg to NRC in Ottawa to set up a Low Temperature laboratory. With MacDonald’s encouragement, after getting his DPhil in 1951 Sydney came to NRC, initially as a Post-doctoral Fellow in the Chemistry Division, working with Dr. J.A. Morrison in the Surface Chemistry group. Two years later he joined MacDonald’s Low Temperature & Solid State Physics group.

In 1954 he was married, in Montreal, to Barbara Henderson, whom he had known in Oxford. Their first home was an apartment overlooking the Rideau River, near the Sussex Drive NRC building, and then later they bought a house a few miles to the east. It was there that their two children, Elizabeth and John, spent their early years.

Sydney's research at NRC was largely in the physics of materials at high pressures and low temperatures, and he published a number of papers, both experimental and theoretical, in collaboration with MacDonald and other members of the group's staff. NRC's Postdoctoral Fellowship scheme brought a number of young physicists to the lab to work with Sydney. These included Drs. P.F. Chester, J.A. Hulbert, J.N. Mundy and K. Okumura. There was a most prolific cooperation with Dr. D. Gugan (later at University of Bristol), largely on various aspects of resistivity in alkali metals and alloys, in the period 1957-63, during which time they published at least 10 papers. Another member of the group at that time was Z.S. (Bas) Basinski (FRSC 1978), an expert in dislocations in metals, with whom Sydney also published several papers in their joint fields of interest.

In the late 50s MacDonald showed the first signs of ALS, and while he was able to continue, with help, for several years, he became steadily more disabled and died in 1963. Sydney took an increasing responsibility for running the group, and took over as head on MacDonald's death.

Sydney was elected FRSC in 1964, and although his career at NRC was by then well established, he wished for a variety of reasons to return to the UK, and in 1965 accepted a chair in Solid State Physics at the University of Leeds. He held that post for 22 years, most of the time as Head of the Solid State Physics Group. He was appointed Cavendish Professor in 1976 on the retirement of Prof. J.G. Wilson. He was twice Chairman of the Department of Physics, and served on numerous University Committees including Senate and Council. On the national scene he was Vice-President of the Institute of Physics, Chairman of the Low Temperature Group of the Institute of Physics, Chairman of several Research Council Committees, a member of the Editorial Board of one of the Journals of Physics and editor of *Contemporary Physics*, which he continued well into his retirement. He also wrote several well-regarded texts on the electrical properties of metals and alloys, and on thermodynamics. He retired in 1987, and was given the title of Emeritus Professor.

In the 1970s the Dugdales bought a cottage property in Gullane, Scotland, initially for use as a holiday retreat. Gullane lies on the Firth of Forth, some 15 miles east of Edinburgh, and close to Muirfield golf course of British Open fame. "Goose Green", after improvements and additions over the years, eventually became quite a substantial house. A few years after Sydney's retirement, the Dugdales sold their splendid home in North Leeds, and moved to Gullane on a permanent basis. Their ties with Yorkshire were not completely severed; however, as they also bought a small cottage in Sydney's home town of Seattle for occasional visits. They lived in Gullane until the time of Sydney's final illness.

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