

Baron DAINTON OF HALLAM MOORS
BA(Oxon), PhD(Cantab), FRS

Frederick Sydney Dainton: born, Sheffield, 11 November 1914; died, Oxford, 5 December 1997, aged 83. Knight Bachelor 1971; Knight Commander, Order of Merit, Poland 1985; Life Peerage 1986; Hon FRSE 1996; Honorary Graduate of 25 Universities. *Medals*: Sylvanus Thompson, British Institute of Radiology 1961; Davy, Royal Society 1969; Faraday, Royal Society 1974; Crookshank, Royal College of Radiologists 1981; 1300 Years, Bulgaria 1982; Curie, Poland 1982; John Snow, College of Anaesthetists 1982; Firth, Forensic Science Society 1993; Semenov Centenary, Russian Academy of Sciences 1996; President's, Institute of Physics 1997.

There can be few people who have had such a distinguished career in teaching, research and administration as Fred Dainton, culminating in his elevation to the peerage in 1986 and his appointment in 1978 as Chancellor of the University of his native Sheffield, an office which he filled with great distinction and which gave him more pleasure than any other of a long series of high-level appointments. A physical chemist of international renown, with more than 260 publications in the scientific journals, he was a man held in wide affection and respect.

His father, George Whalley Dainton, was married first to Sarah Bottrill who died after the birth of her fifth child, and then to her sister Mary Jane who bore him another four children of whom Fred was the last. In his autobiography Fred tells us that his father had a secret admiration for Frederick the Great, and that this is how he came by his first name. We may see in this a prophetic choice! His father was born in 1857, too early to have received much formal education and to the end of his days could scarcely read or write, but as a highly skilled stonemason taught himself to draw plans that other men could use; and as Clerk of Works was employed by many well known architects. He had an intense interest in all that went on in the world and from an early age Fred spent many hours reading to his father, followed by discussion. Thus, long before Oxford, he was exposed to the tutorial system, and his later extraordinary ability to read, digest and summarise large amounts of information in clear and concise form undoubtedly stemmed from this early discipline.

In 1925 the young Fred won a scholarship to the Central Secondary School in Sheffield, where he obtained a very good grounding not only in science but also in languages and in Shakespeare. In the Public Reference Library he came across the classic books of the Oxford chemists Sidgwick and Hinshelwood and determined to follow in their footsteps. He took the college examinations and was awarded an Exhibition by St. John's College, Oxford, in spite of inadvertently missing an optional paper in mathematics. A supplementary grant and loan from the City of Sheffield ensured that he would not have to depend on his now-widowed mother.

Arrival at Oxford in 1933 proved something of a shock especially when the first essay set by his tutor H W Thompson was referred back for a second attempt. This was such a salutary experience that in due course Fred adopted the same technique with generations of Cambridge students. Having obtained a first in Part II his mentors expected him to stay on for a DPhil, but Fred, ever an independent thinker, had other ideas. When sent for by the President of St. John's to know why Oxford was not good enough for him, Fred silenced him by recalling from his schooldays the opening lines of Valentine to Proteus in *The Two Gentlemen of Verona*:

"Home-keeping youth have ever homely wits,
.... I rather would entreat thy company
To see the wonders of the world abroad,
Than, living dully sluggardiz'd at home...."

Oxford's loss was Cambridge's gain and Professor R G W Norrish was quick to recruit Fred to work with him, initially on the methane/oxygen reaction sensitized by nitrogen dioxide and then on the hydrogen/oxygen reaction sensitized thermally and photochemically by the oxides of nitrogen and nitrosyl chloride. Then came the war. Being unfit for military service because of his short sight Fred Dainton was persuaded to stay on in Cambridge to carry a substantial portion of the teaching load in physical chemistry, at the same time being involved in various extra-mural wartime projects requiring chemical expertise. He was also responsible for organising air-raid precautions and fire-watching rotas which enabled him to further his acquaintance with an attractive young research student in Zoology, Barbara Wright. They were married in 1942, an event which Fred has described as the most important in his whole life, for they were ideally suited. A poignant moment came 50 years later when as Chancellor of Sheffield University he conferred on Barbara the honorary degree of DSc.

As the war drew to its close Fred began to consider what future lines of research he would pursue, sharpened by Norrish's later injunction to keep off his patch! The areas of polymerization and kinetics of photochlorination looked promising and he made some preliminary investigations, but received a setback in July 1945 when a sample of diacetyl peroxide exploded in his left hand resulting in the loss of the index finger and other painful injuries. His later close interest in setting up the Queen's Medical Centre at Nottingham stemmed in part from his experiences in Addenbrooke's Hospital at this time.

For the first year after the war I was Fred's only research student and had a free choice of all the problems listed in his notebook. One was the so-called 'ceiling temperature' phenomenon in which a certain polymerization reaction had been reported to defy the laws of chemical kinetics and cease above a certain temperature. I soon confirmed this and studied the effect of concentration and catalyst, but still an explanation eluded us. I well remember the day when, sitting beside Fred in his room in St. Catharine's, he said, "Let us suppose that the propagation step is reversible", and slowly wrote down the appropriate rate expression. Suddenly the scales fell from our eyes and it became clear that this would not only explain all the data but would allow predictions that were soon confirmed. The ceiling temperature was none other than the chemical equivalent of a melting point. This was a rare and exciting moment and Fred strode back to the laboratory like a dog with three tails. The principle was of general application in addition polymerization and a subsequent publication is said to be one of the most widely quoted in polymer chemistry.

In 1946 a three-month visit to the atomic energy establishment at Chalk River in Canada marked the beginning of a new and very profitable area of research for Fred, namely radiation chemistry (chemical change induced by ionizing radiation). After moving to Leeds as Professor of Physical Chemistry in 1950 he was able greatly to develop this work when high energy sources became available in conjunction with Cookridge Hospital on the outskirts of Leeds, first a 1000 Curie cobalt-60 source in 1956 and later, in 1964, a 3MeV Van de Graaff generator capable of delivering very short pulses of very energetic electrons. Initially the work concentrated on aqueous solutions, but later expanded into non-aqueous and glassy systems. The postulate that a significant initial species in irradiated water was the hydrated electron, ridiculed by certain physicists at the time, was ultimately proved correct. His outstanding work was recognised in 1957 by his election to Fellowship of The Royal Society.

It is said that there are many people who would make very good Vice-Chancellors but prefer to stay in their own subject. Fred undoubtedly fell into this category for he resisted a number of tempting offers before finally yielding to the University of Nottingham in 1965. Here the big attraction was that he would not only have the opportunity of setting up an entirely new Medical School, but would also be able to continue his research as Honorary Director of the Radiation Research Centre at Leeds. However, the period at Nottingham was marred by the onset of student 'troubles' which were an irritating distraction from the main task. One student complained to Fred that that he did not conform to the preconceived image of repressive authority, nor did the militants appreciate his sense of humour when he reserved a room for 'The Free University of Nottingham' abbreviated to FUN, and they were discomfited by his quote from Mao's Little Red Book "Respect your teachers; they know more than you do". After 5 years, when the establishment of the Medical School was well advanced, and the opportunity came to return to his Alma Mater as Dr Lee's Professor of Chemistry (Hinshelwood's former Chair), Fred decided it was time to move on.

Except on special occasions Fred preferred to dress informally. Shortly after the announcement of his knighthood in 1971, he went to collect his mail on Saturday morning, casually dressed. The porter said he would have to wait until it was sorted. But Fred, ever the quick thinker, suggested that the porter should take out the first ten letters and if most were not for him he would come back later. As letter after letter came out addressed to Sir Frederick Dainton FRS, the porter looked ever more bemused and uttered the immortal words, "But you don't look like a Sir, sir"!

In 1968 Fred had chaired a Government enquiry into 'The Swing away from Science'. In 1970 he was again heavily involved in national affairs as Chairman of the Council for Scientific Policy (CSP). It was clear that the whole system was in need of review and on 27 October, following the change of Government in June, Fred had his first meeting with the new Secretary of State for Education and Science, Margaret Thatcher. After being interrupted several times, he calmly suggested that she should first hear all the arguments, to be followed by question and answer. After a long stony silence she concurred and thus began a long and fruitful exchange of ideas with her on this and other matters. The Report of the CSP and that of the separate Rothschild 'Think Tank', published as Appendices to the Green Paper *A Framework for Government Research and Development* in November 1971, generated a flood of discussion and led to invitations to discuss such matters at high level all over the world. At home the consequence was that in October 1972 the CSP was replaced by the Advisory Board of Research Councils of which Fred became the first Chairman. At the same time in 1972 Fred began a two-year stint as President of The Chemical Society when the amalgamation with the Faraday Society and Royal Institute of Chemistry was still under negotiation. He was also heavily involved in the Committee that had been set up to reorganise the University of London.

All this was a considerable distraction from his duties as an Oxford Professor and matters finally came to a head when Fred was invited to become Chairman of the University Grants Committee in 1973, a post which he had previously declined in 1968. This time he decided to accept. It was indeed fortunate for British Universities to have had such a determined champion of academic freedom and University autonomy at a time of increasing financial stringency and tendency towards market-driven research.

One of the many problems at this time was the provision of money for the ever-expanding University libraries. In 1977 the then Secretary of State, Shirley Williams, had also to face the question of what to do about the proposed new British

Library at St Pancras. Fred's advice was that it should be given top priority. This was accepted and on retiring from the UGC in 1978 he was asked to become Chairman of the British Library Board, a post which he held for the next seven years. The change of Government in 1979 and a vociferous lobby in favour of retention of the British Museum Reading Room caused further delay. But Fred's arguments won the day and the foundation stone was finally unveiled (not laid until the excavations had been completed) by the Prince of Wales in 1982. After many vicissitudes the Library opened its doors to readers in 1997 shortly before Fred died. Of his many achievements the British Library will perhaps stand as his most lasting memorial.

Many other jobs came his way during his 'retirement', including Chairman of the National Radiological Protection Board (1979-85), Chairman (1980-90) and President (1990-97) of the Royal Postgraduate Medical School at Hammersmith, Chancellorship of the University of Sheffield (1978-97), and Prime Wardenship of the Goldsmith's Company (1982-83). The last of these gave Fred particular pleasure because of the financial support given to him by the Company whilst an undergraduate at Oxford and postgraduate at Cambridge.

Throughout his life Fred enjoyed walking the moors and mountains and when it came to choosing a title for his Life Peerage in 1986, and not being allowed to use the name of his native city (reserved for dukes), he decided on Hallam Moors where he had often walked as a boy. Not surprisingly he chose to sit on the cross-benches leaving himself free to treat every matter on its merits. In so doing he won respect and admiration from all sides of the House and he is particularly remembered for his incisive chairmanship of three Select Committee enquiries into, respectively, forensic science, systematic biology, and short-term contract workers.

A warm, compassionate man he took great pains always to thank publicly the staff who worked behind the scenes: technicians, waitresses, chefs, secretaries, and civil servants; but he could also, when required, display a devastating Yorkshire bluntness. And having listened to all the arguments on a subject his considered conclusions would nearly always carry the day, which is what made him such a good chairman. He greatly enjoyed his numerous trips abroad, especially when this allowed him also to have a holiday with Barbara and to meet some of his old friends, students and colleagues, with whom he kept in close touch.

Early in 1989 the Registrar of the University of Sheffield showed Fred a rusty chisel on the side of which, barely discernible, were the letters *G Dainton*. It transpired that in 1930 his mother had given her deceased husband's tools to his last apprentice, Charles Gibbs, who had only become aware in 1989 that 'young' Fred, now Chancellor of the University, was the son of his former employer. The upshot was that these tools were given back to Fred to be housed in an oak case below the Chancellor's portrait in the University, a fitting reminder of the teacher-pupil relationship that had been the life-blood of both father and son.

Before he died Fred had almost completed the first draft of his autobiography. When published it is sure to have a wide readership and will make compulsive reading for all those who were fortunate enough to have known this most remarkable, gifted man. He is survived by his wife, who was his constant support throughout 55 years of happy married life, a son who is Professor of Physics at the University of Liverpool, two daughters and three grandchildren.

I am indebted to Lady Dainton for allowing me access to unpublished material.

KEN IVIN