

Sir DEREK (HAROLD RICHARD) BARTON
BSc, PhD, DSc(Lond), FRS

Sir Derek Barton's sudden death in his 80th year, on 16 March 1998, ended the still-active career of the most distinguished British organic chemist of his generation. An account that did even scant justice to his achievements would require the space of a biography. Here it must suffice to illustrate briefly his multifarious contributions to organic chemistry and to commemorate the lasting influence of a remarkable man on the great body of former students and colleagues.

Derek Barton, or DHRB as he was often known, was born on 8 September 1918 and educated at Tonbridge School. He graduated in 1940 after 2 years at Imperial College and obtained his PhD just 2 years later; the award of the DSc followed in 1949. As was usual during the war years, his postgraduate research was on a topic of national interest, namely the synthesis of vinyl chloride by the gas-phase pyrolysis of 1, 2- and 1, 1-dichloroethane. At the end of the war he spent a year with Albright and Wilson Ltd then returned to Imperial College as an Assistant Lecturer to teach practical inorganic chemistry to mechanical engineers. An ICI Fellowship (1946-49) enabled him to develop the interest in the structure and synthesis of terpenes and steroids that was to flower during a sabbatical year (1949-50) at Harvard. He was invited there by Louis Fieser with whose encouragement he submitted the seminal paper on 'conformational analysis', as it became known, that appeared in *Experientia* in 1950 and led to his share, with Odd Hassel, of the 1969 Nobel Prize for Chemistry.

Before 1950 there was little interest taken in the precise shapes or 'conformations' adopted by flexible molecules, but within the following decade conformational analysis became a central concept in wide areas of chemistry and biochemistry. Hassel had earlier deduced the preferred conformations of *cis*- and *trans*-decalin, but these flexible forms were regarded as having only superficial significance in comparison with the classical, fixed stereochemical features of molecules. Barton showed that conformational analysis could be used to predict chemical reactivity and to decide between alternative reaction pathways. He often referred to the *Experientia* publication as "my lucky paper", insisting that others could have drawn the same conclusions had they read the literature. He advised his co-workers to devote as much time as possible to critical reading, maintaining that creative ideas cannot develop in a vacuum but need the stimulus of observations gleaned from published research, sometimes in unfamiliar fields, or from lectures and seminars.

After leave in Harvard, Barton became successively Reader then Professor at Birkbeck College, London (1950-55). He was not always tactful in dealings with influential British chemists, but even those with ruffled feathers soon acknowledged his status as a candidate for a senior Chair. The Regius Chair in Glasgow became vacant with the appointment of J W Cook as Vice-Chancellor of Exeter University, and Barton accordingly moved north in 1955, just after the Oxford Chair had been taken by E R H Jones. There had been no immediate prospect of a post at Cambridge or Imperial College. However, R P Linstead unexpectedly became Rector of Imperial College and his Chair was then occupied by the internal appointment of E A Braude, only to be vacated again by the latter's tragic suicide. Thus, after just 2 years in Glasgow, Barton returned to London to revitalise organic chemistry at Imperial College.

Barton's brief stay in Glasgow was productive and for the only time in Britain his every request for resources was met immediately and in full. He began a fruitful collaboration with J Monteath Robertson on the X-ray structure determination of complex natural products and developed important lines of research, including organic photochemistry and the oxidative coupling of phenols, that were continued at Imperial College. The latter research arose from a mechanistic reinterpretation of an old experiment and the consequent revision of the structure of Pummerer's ketone, an oxidation product of *p*-cresol. The original structure had been generally accepted and indeed was used by Sir Robert Robinson as a model for the biosynthesis of morphine. Its revision had immediate synthetic and biosynthetic implications for morphine and a wide range of other phenolic alkaloids. With T Cohen, Barton published a new biosynthetic theory, based upon the oxidative coupling of phenols, which was soon to be verified at Imperial College by an extended programme of radiotracer experiments in higher plants.

The period (1957-78) at Imperial College saw the diversification of Barton's research and the emergence of his life-long interest in the invention of new synthetic reactions, often in response to a challenging problem in the chemical industry. A striking example was the invention of the Barton Reaction for the directed functionalisation of specific sites in molecules by the photolysis of nitrite esters, which was first tested at the RIMAC Institute, founded by the Schering Corporation in Cambridge (Mass.). This new technique was initially devised to provide a short, practical synthesis of the rare, steroidal hormone aldosterone, although its wide applications were soon exploited. It was said that more time was spent retrospectively searching the literature than effecting the synthesis, since Barton could not believe that such a simple idea had been previously overlooked! Similarly, the elegant design of the Barton and McCombie reaction for radical deoxygenation, and its later developments, arose from the industrial need to remove hydroxy groups from sugars.

In 1977 Barton made the bold decision to retire early from Imperial College and begin a new career in France. He became director of the ICSN, a government-financed research institute at Gif-sur-Yvette. His second wife Christiane was French

and he understood the language perfectly and spoke it fluently with what he described as “an English accent that is supposed to be charming”. Moreover, his new retirement age was 70, although the incoming French government soon curtailed it. At Gif (1978-87) he worked harder than ever and accomplished as much as in the productive decade from 1950 to 1960. In particular, he embarked on a major research programme, with the support of British Petroleum’s ‘blue sky’ fund, which continued for his remaining years. He developed a series of ‘Gif reagents’, with iron as a key catalytic component, aimed to mimic non-enzymically Nature’s ubiquitous oxygenation at saturated, unreactive carbon. The long-term aims were to gain insight into biochemical oxygenation and to develop reagents applicable generally in organic synthesis.

As retirement from Gif approached, Barton gladly accepted the offer of a third career, as a Distinguished Professor at Texas A&M University, where he stayed from 1986 until his untimely death. His enthusiasm for research remained unabated, as did his immense capacity for work and the resulting flow of research papers. The 1995 award by the American Chemical Society of their Priestley Medal coincided with his ‘in house’ appointment as the Dow Distinguished Professor of Chemical Invention, providing further indications that retirement was unthinkable for DHRB. Learned societies, universities and governments paid worldwide tribute to his scientific achievements; existing records list over 60 medals, honorary professorships, lectureships and doctorates as well as his knighthood (1972). Here it is more appropriate to end with some comments on the man himself.

Derek Barton early acquired the reputation of being hard and uncompromising, a reputation that grew as much from anecdotes as first-hand knowledge. True, he could deal harshly with fools and the lazy, but anyone demonstrating a serious attitude to work and chemistry soon gained his respect. To these, especially the young and inexperienced, he showed a patient willingness to help and guide. At question time after colloquia the sight of Barton in the audience could unsettle even confident speakers. His ability to detect flaws in an argument and to reveal publicly gaps in a speaker’s knowledge of chemistry was legendary, and woe betide the pretentious or those who tried evasion as a form of self-defence! His academic staff learned to be alert before, as well as during and after, colloquia. Occasionally, with advance warning of seconds rather than minutes, he would invite a young colleague to introduce the speaker, with an encouraging remark such as “Of course you know all about Dr X’s published work”.

On first acquaintance, Barton might appear austere and reserved, an impression reinforced by his unconscious use of the regal ‘we’ in discussions, but new co-workers soon discovered a sense of humour and inherent kindness beneath the formidable exterior. He could be abrupt with those who failed to perform to the best of their ability, but an intelligent suggestion or a hard-earned result was rewarded with generous praise and encouragement. Naturally, he mellowed with time and came to enjoy relaxations other than reading the journals, even if he still maintained that “all a young man needs is a bench and a good library”. He could then be excellent company on convivial evenings with a fund of anecdotes and reminiscences to entertain his friends.

Science has lost a great chemist, but Sir Derek Barton’s true memorial is the lasting respect and affection of his students and colleagues; their loss and especially that of his third wife Judith is deeply felt.

GORDON W KIRBY