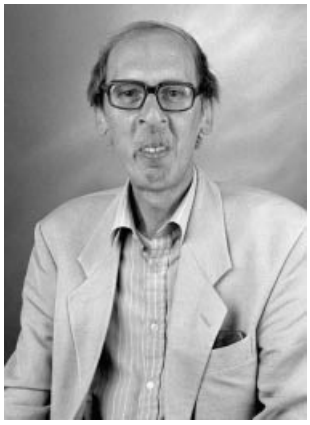
Ron Snaith (1947−2000), Inspirational Alkchemist and Altruist



This volume is dedicated to the memory of Dr Ron Snaith, the highly respected and much-loved scientist, teacher, researcher and raconteur, whose sudden and tragic death on the first day of this millennium, January 1st 2000, shocked his family and friends throughout the world. His passing deprived his widow Jane, son Tom, and daughter Katie of a loving, adored husband and father, and the chemical community at large of a remarkably influential pioneering researcher, writer and speaker. He was an unforgettable character, regarded with great affection by all who came to know him, particularly those who had had the privilege to have been taught by him. It is a measure of the high esteem in which he and his chemistry are held that, three years after his death, an international meeting, the third in a series he founded, concerned with alkali and alkaline earth metal chemistry (ALKCHEM 3, Würzburg, Germany 28/9/03−2/10/03) should be dedicated to his memory, and that so many fellow chemists should have contributed papers to this special memorial volume.

Ron was born in Kingston-upon-Hull, Yorkshire, in 1947. Fiercely proud of the county of his birth, he showed its legendary grit, determination and spirit in all he did. A born communicator, and blessed with a sympathetic character that allowed him to see the world from others' viewpoints, he was able to turn a feeling for the pithy phrase, a gently sardonic sense of humour, and a capacity for self-mockery to excellent effect in his interactions with others, consistently instilling wit and good humour daily into their lives. In this increasingly egocentric world, he was remarkably altruistic, putting the needs of others ahead of his own, particularly the needs of those least able to help themselves. His concern for the underdog, the underprivileged, permeated his thoughts and actions.

His route into a research career in chemistry was unorthodox. Whilst studying for his BSc in chemistry at Durham University from 1965−1968, he originally intended, on graduating, to become a teacher at secondary school level (pupils aged 11−18), preferably working with pupils who were disabled. His interest in his chosen subject was, however, fired by lectures from Professor Geoffrey Coates, the charismatic pioneering organometallic chemist who headed the Department of Chemistry at Durham from 1953−1968. Subsequently, having gained a richly deserved first class honours degree in 1968, Ron stayed on at Durham (1968−1971) to secure a science Ph.D. to ensure he had some leverage later when he embarked on his career. As Coates moved in 1968 to Laramie, Ron worked for his PhD with Ken Wade, then a lecturer at Durham (formally Ron's research supervisor, Ken was soon to find himself learning more from Ron than vice versa). Having completed his PhD in 1971, Ron spent a year training as a teacher, still in Durham, before going on to teach chemistry very successfully for the next seven years at Durham Johnston Comprehensive School, putting his subject across with inspirational flair and insight, creating a generation of young enthusiasts who went on to study the subject at university and then make their own careers in chemistry. His former pupils at Johnston School (originally founded, as a technical school, by the first professor of chemistry at Durham University, J F W Johnston FRS) include some distinguished figures in UK chemistry today such as David Parker FRS, who now heads the Chemistry Department at Durham (for the second time) and Paul Attfield, chair of material science at the University of Edinburgh. It is no surprise that Ron's talent as a born teacher was recognised at Johnston School from his arrival there, and he rose rapidly to head his department.

It was from Durham Johnston School that Ron was head-hunted, in 1979, by Professor Peter Perkins, then head of inorganic chemistry at the University of Strathclyde, in Glasgow. Perkins was seeking a charismatic teacher, one able to communicate with and interest students who were required to study the subject in their first year at university but who might not go on to study the subject in depth as specialists. Ron proved so adept at this, making chemistry not only intelligible but also genuinely interesting, indeed fascinating, that he soon became a rising star in the Department of Pure and Applied Chemistry at Strathclyde. It was there that he started the researches into aspects of lithium chemistry that were soon to establish him as a leading authority on s-block chemistry.

The reputation he acquired at Strathclyde, however, prompted another university, this time Cambridge, to head-hunt him, and he moved to a lectureship there in 1986, subsequently being promoted to a Readership in Main Group Chemistry in 1998. His growing stature at Cambridge prompted many invitations for him to move again, to chairs elsewhere in the UK or abroad, but these came during a period in which another move would have been inconvenient for family reasons, and anyway he found

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his departmental and college work at Cambridge too fulfilling to succumb to any of these tempting invitations, for which scores of students who passed through the Chemistry Department and/or St John's College during the nineties will be most grateful. The outside world is aware of Ron's scientific work at Cambridge through his publications. His staff colleagues in the chemistry department and in St John's College will be aware of the enormous amount of work he did, whether as a brilliant lecturer and sympathetic teacher in a world-class department, as an acutely conscientious and fair admissions tutor and patient undergraduate supervisor in a historic college, or as a committee man and helper always prepared to lend a hand with many duties.

Although Ron acquired a well-deserved reputation as a chemist, his knowledge of and lectures on Egyptology probably brought him into contact with a wider public in the UK, and certainly deserve a mention here. His long-standing interest in ancient civilisations flourished through a friendship with Professor Tom Thacker, Head of Middle Eastern and Oriental Studies at Durham in the sixties and seventies. From his graduate student days, Ron soon became skilled at the specialist applied chemical techniques needed for the safe cleaning of priceless but corroded artifacts made centuries or millennia earlier. Indeed, at one time he came near to carrying out postdoctoral research in restoration work on items in the Oriental Museum at Durham. Later in his career he was in great demand on the lecture circuit on the subject of Egyptian Mummies, on which he spoke with consummate authority and brilliant wit and humour, tuning his raconteur's discourse on the subject with unerring skill to the background and interests of his audience, reducing his captivated listeners (whether schoolchildren, undergraduates, enthusiasts for the advancement of science, or members of women's institutes) to helpless laughter as he entertained them with hilarious tales about Isis, Osiris, assorted other gods and their bizarrely scattered vital parts, yet still imparting a feeling for ancient civilisations, hieroglyphics, early alchemy, and the technicalities of mummification.

As a researcher in chemistry, Ron was a thoroughly reliable experimentalist, bravely prepared to tackle systems that were so acutely air-and moisture-sensitive as to discourage others from attempting to work with them. Like his experimental work, his written or oral presentations of his work were also always meticulously well prepared, and conveyed clearly the insight and implications his results generated. He could turn his hand to preparative, spectroscopic, structural or bonding problems with equal facility, and thought laterally, making connections others had not spotted, highlighting the common characteristics of seemingly disparate species.

His early Ph.D. work on ketimino derivatives $(R_2C{=}N)_xM$, $(RC{=}N)_xMX_y$, $(R_2C{=}N)_xMLi$, etc, of such elements M as boron, aluminium and silicon, established and consolidated the link between the structures of such systems, particularly their CNM bond angles, and the number of electrons (1 or 3) the ligand provided for bonding terminally to a metal or metalloid, deduced from "sporting" methods such as IR or NMR spectroscopy if X-ray evidence was unavailable as was often the case in those days. He showed, in early examples of the method, how the state of aggregation of his products could be controlled by use of judiciously chosen bulky substituents, and was thereby responsible for preparing the first set of monomeric ketiminoboranes R_2CNBR_2, isoelectronic with allenes R_2CCCR_2, that contained linear CNB skeletons. His syntheses of these compounds entailed the use of *N*-lithio-ketimines, $R_2C{=}NLi$, as reagents, though their structures were not then known. He was later to solve their structures at Strathclyde, and show their importance in elucidating structural patterns in lithium chemistry. Also in the course of this work on ketiminates, he generated systems exhibiting significant C-H···M interactions like those found earlier by Erwin Weiss in his classic studies on lithium alkyls. Interestingly, it was to be some years before these types of interaction were detected in transition metal systems, hailed as novel, and dubbed "agostic".

In his career, Ron spent no time on conventional postdoctoral studies. However, he found time during his doctoral, teacher-training, and school-teaching years to read widely in boron cluster chemistry, on which he also became an authority and wrote a number of reviews that were well received. He later developed new methods of deducing the enthalpies of formation of such systems, initially using classical bond length-bond energy arguments but later adapting for this purpose the bond index concept developed by David Armstrong and Peter Perkins at Strathclyde. Also with David Armstrong, Ron carried out ab initio MO calculations on borane cluster systems long before such calculations became as routinely possible as they are now.

However, it is for his lithium chemistry, notably his elucidation of the patterns that permeate the structural chemistry of lithium, that he is best known. His inspired use of amino and ketimino ligands, R_2N and $R_2C{=}N$, allowed him to exploit and probe both electronic and substituent bulk effects. The twofold symmetry of these ligands, and the complementarity of the orientations of their alkyl groups (in the plane of the nitrogen lone pairs in the latter case, out of that plane in the former case) led to either laddering or stacking of the $(LiN)_n$ rings (n = commonly 2 or 3). Through Ron's ingenuity and vision, what began modestly as an esoteric study of lithium amides and lithium ketimides was transformed into ring-stacking and ring-laddering principles that could be applied with equal relevance and rigour to the structures of lithium organoelement compounds in general, including alkoxides, alkyls, aryls, alkynyls, enolates, halides and phosphides, and to the heavier alkali metal congeners. Developed through a series of key papers, these ideas were later expounded by Ron in a seminal review article on "structures of organonitrogen-lithium compounds: recent patterns and perspectives in organolithium chemistry" (*Adv. Inorg. Chem.* **1991**, *37*, 47−142), which was co-written with Karina Gregory and Paul von Ragué Schleyer (with whom

Ron teamed up to probe the nature of the bonding in his lithium-nitrogen systems). How fitting that Ron, a son of a builder, should become an expert in the design and construction of molecular architectures.

Ron went on to show that the structural principles applicable to salts of electropositive metals with organic anions are also equally applicable to salts of the same metals with inorganic anions. This led him to develop the ''ammonium salt route'' for the synthesis of a series of novel Lewis base-captured molecular fragments of common inorganic salts. One of his great strengths was in recognising the significance of a single result, and designing a comprehensive project around it. His discovery that water and lithium, long regarded as incompatible in organolithium chemistry, can indeed coexist in an organic compound (derived from 2-mercaptobenzoxazole) is a case in point, which led him to an in-depth investigation of aqua and other protic ligand complexes of alkali and alkaline earth metal organic compounds.

Having devoted much of his career to solving and rationalising the structures of lithium reagents, Ron later turned to documenting the mechanisms by which lithio reagents operate in organic syntheses. The results were published in a string of definitive papers detailing the identities and the solid-state and (more importantly) solution structures of lithium-based intermediates isolated during the courses of several key organic syntheses, not only providing benchmarks by which such reactions can be understood, but also underlining the comprehensive, interdisciplinary nature of modern chemistry, where pooling the resources of organic, inorganic, organometallic and mechanistic investigations is necessary if we are to understand the subtleties and complexities of what initially may appear straightforward reactions between the monomeric species by which reagents are so commonly, and misleadingly, represented in equations.

Sadly, the death of Ron in his prime means that this particularly promising line of work was taken less far than he had planned. Bereft of his unique approach and originality, it will not be developed in the way he himself would have taken it. However, as a superb teacher and source of inspiration to generations of graduate students and postdoctoral co-workers, he has ensured that his ideas and philosophy will live on. Ron's own publications ensure that his very substantial contribution to science remains available to us. He has also bequeathed to academia many former students and co-workers who have themselves gone on to highly successful research careers, including Matt Davidson (Bath), Rob Davies (Imperial College, London), Rab Mulvey (Strathclyde), Andy Wheatley and Dom Wright (both Cambridge). They themselves have won a clutch of prestigious Royal Society of Chemistry Awards (Meldola/Harrison Memorial/Main Group Element Medals and Prizes). He also had a major influence on the academic careers of two former postdoctoral associates (Frank Mair, UMIST and Dietmar Stalke, Würzburg). This legacy to research chemistry is all the more remarkable given that Ron always deliberately restricted the size of his research group to a select small number.

Ron himself won the RSC Award for Main Group Element Chemistry in 1996, an award which undoubtedly would have been followed by many more awards had he survived to pursue a normal length career. Characteristically, throughout his life, he was always self-effacingly concerned to see that others gained the recognition he did not seek for himself, a true altruist. Inspirational in chemistry and in how to live one's life, Ron had a generosity of spirit and infectious good humour that enriched and transformed the lives of all who knew him, and will live long in their memories.

Throughout his career, Ron was given immense and unstinting support by Jane, whom he had met when they were both students at Durham (she herself took a PhD in engineering science). She and Tom (who followed in his father's footsteps to take a first in chemistry at Durham in 2000 before turning to law) and Katie (close to completing her studies for a Master's degree in criminology) were a source of great pride and joy to Ron, who appreciated their tolerance of his not infrequent preoccupation with chemistry. We, and the chemical community at large, share their loss, in his prime, of this highly talented, kind, considerate, lovable man.

Robert E. Mulvey and Ken Wade

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