J Clust Sci (2014) 25:879–881
DOI 10.1007/s10876-014-0747-8

IN MEMORIAM

Professor Ken Wade, F.R.S. 13th October 1932–16th March 2014

Ken Wade opening the Coates Laboratory at Durham University, 24th September 2011

Professor Ken Wade, F.R.S. and one of the great gentlemen in science, passed away unexpectedly on March 16th of this year. Ken was an outstanding chemist, a selfless and wise leader, and a true friend to all who knew him. Through his advice, support and encouragement, generations of colleagues, co-workers, students and friends have prospered, and he leaves us with these fond memories, in addition to a legacy of the insightful, elegant and simple rules concerning the structure and bonding of chemical compounds that are inexorably linked with his name.

Kenneth Wade studied Chemistry at the University of Nottingham from 1951 to 1954. In his final year, the young Wade studied the (then only!) three major branches of Chemistry, Organic, Inorganic and Physical, receiving grades of β, α- and the curiously recorded β?+ . One can only surmise that this point in his fledging career was the origin of what would become known at Durham as Wade's Other Rule (no mark should fall one point less than a grade boundary).

Ken's PhD studies, also at Nottingham, were taken under the supervision of Norman Greenwood. He received his degree in 1957, for a thesis entitled *Addition Compounds of Boron Trichloride and Gallium Trichloride*. This period not only marked the formal beginnings of Ken's fascination with the structure and reactivity of the Group 13 elements, but also laid the foundations of a lifelong friendship with Norman. Ken subsequently took up postdoctoral studies at Cambridge with Harry Emeléus from 1957–1959, where he was charged with investigating the synthesis and properties of the less stable boron hydrides. In a brief account of this period in *Nature Chem.* (2009, **1**, 92), Ken committed his 'leather apron' story, which he used to tell to each cohort in Durham as part of his lectures on the chemistry of the main group compounds, to print. Modern health and safety committees may not find the story as amusing as the undergraduates! Having failed to develop the next generation of rocket fuels, but experienced the 'green flash' that characterised the end of many an experiment and unearthed some chemistry of diborane, Ken moved to Cornell for a year over 1959-60 to work with Albert Laubengayer and extend his studies on Group 13 adducts to derivatives of triphenylalane.

Ken returned to the UK in 1960 for a brief period as a Lecturer in Inorganic Chemistry at Derby College of Technology, before being enticed in 1961 to move to Durham by Geoffrey Coates, whom Ken held in the highest esteem throughout his career, as part of a visionary expansion of the Chemistry Department. Ken rose through the ranks to be promoted to Senior Lecturer (1971, the same year as the publication of his most celebrated work *The Structural Significance of the Number of Skeletal Bonding Electron-pairs in Carboranes, the Higher Boranes and Borane Anions, and Various Transition-metal Carbonyl Cluster Compounds*), Reader (1977) and Professor (1983). Ken served as Head of the Department of Chemistry at Durham from 1 October 1986 to 31 July 1989, during which he oversaw the transition of the Department's operating structure and instilled in the Department the spirit of collaboration and cooperation that lasts to this day. Undoubtedly, it is this camaraderie and team ethos inspired by Coates, encouraged by Ken and maintained by successive generations of staff that has seen the Durham Department rise to one of the most successful in the UK. Ken was elected a Fellow of the Royal Society (London), the highest scientific honour that the UK can bestow, in March 1989. Ken retired in 1997, whereupon he was granted the title of Emeritus Professor at Durham.

Despite his success Ken never wished to lead a large research group, but worked with small teams of outstandingly talented students and postdoctoral fellows. Ken's students and co-workers gained a complete education with him, and rather than being shackled to an idea and the bench, were encouraged to pursue their own intuition and develop their ideas under Ken's patient eye. He provided his group with gentle guidance and staunch support, coupled with an occasionally annoying habit of summarising a complex expression of an idea in a few concise sentences. Perhaps these qualities are best illustrated by his role in the development and expression of the ring-stacking and ring-laddering concepts in organolithium chemistry in collaboration with his protégé and life-long friend Ron Snaith. Indeed, there is probably no greater tribute that can be offered to Ken than to note the great affection in which he is held by all of his former students and colleagues.

Ken is best known to the wider community for his outstanding contributions to the rationalization of the structures of otherwise perplexing rings and clusters. Ken's intuitive sense of Chemistry and bonding patterns was coupled with a gift for succinct expression, and the Abstract to his 1971 work that set out the celebrated Rules could, and most likely are, used as the summary to many a lecture on cluster structure and bonding. However, it should also be remembered that the Polyhedral Skeletal Electron Pair Theory (Wade's preferred term, in typically modest fashion) contained the essence of another key to the practical application of bonding theories, the isolobal analogy, for which Roald Hoffmann was awarded the 1981 Nobel Prize in Chemistry. In his Nobel lecture, whilst acknowledging the contributions of others to the development of the isolobal concept, Hoffmann stated (among recognition of the roles played by those other greats, Halpern and Dahl) that

…most importantly, K. Wade and D. M. P. Mingos independently developed a comprehensive and elegant picture of the electronic structure of transition metal clusters by relating them to the polyhedral boron hydrides (which W. N. Lipscomb and I studied - the circle closes!) It is a trivial step from BH to CH^{+}*. All of these workers saw the essence of the isolobal analogy.*

Despite the importance of his work, Ken was a humble and self-effacing individual, who would be genuinely embarrassed by platitudes or attempts at lavish praise. He was a kind and gentle character, who was far more comfortable discussing what was new and the puzzle at hand than being feted for what had already been done. His humility, especially when describing areas of chemistry in which he'd been so pivotal, did cause some difficulties. Ken genuinely loved his teaching, and his undergraduate lectures were always simple and clear, with the tendency for an amusing side story, and all done with a twinkle in his eye. However, his refusal to refer to Wade's Rules as such caused challenges for many a student trying to use the index to find the relevant discussion in a text-book!

As a senior colleague, Ken was a true rock, one who could be counted upon for sage advice to the most senior of colleagues, and encouragement to the greenest of new recruits, the latter to which I willingly and gratefully testify. His kindness, generosity of spirit, and willingness to bestow his time and talents on others, coupled with his childlike enthusiasm for all things chemical, and most wonderful sense of humour, endeared him to all. To those that had the privilege of knowing him, Ken Wade was far more than a great chemist; he was a great man, and a true friend. We will all miss him greatly but, with sincere apologies, we will continue to fondly refer to those succinct rationalizations of cluster structure and bonding as "Wade's Rules".

Vale Ken Wade, for we will not see his like again,

Paul J. Low