

## CLIFF LUDMAN

A tribute; 19 June 2019

Clifford (Cliff) John Ludman, born in 1940 on October 1, graduated from Cambridge University - Gonville and Caius College – with a Baccalaureate in Natural Sciences (1962) and a Doctorate of Philosophy in Chemistry (1965). The title of his doctoral thesis is *The methoxide ion as a Lewis base*; Thomas C. Waddington was his doctoral supervisor. After postdoctoral work, 1965-7, at Boston College, Chestnut Hill, Massachusetts on nitrogen-fluorine compounds he took up a research fellowship at the University of Warwick to work from 1965-9 in preparative and structural inorganic chemistry, with Waddington, by then professor, as principal investigator.

Cliff's research at Warwick began with a study of the reactions of the methoxide ion with Lewis acids in anhydrous methanol, using conductimetry to monitor the reactions. Among the new compounds isolated were  $K_3Fe(OCH_3)_6$ , with hexacoordinate iron. However, Waddington's infectious enthusiasm for broadening knowledge switched to molecular structures amenable to study using the spectroscopic techniques gaining popularity at Warwick: Raman scattering, nuclear-quadrupole resonance and incoherent inelastic neutron scattering [=INS]. Through those and other techniques the structure of the  $HCl_2^-$  ion was shown to be nonlinear. An effective working arrangement began to emerge: Cliff's fastidious laboratory work would generate a pure sample of a substance of structural interest to many, it would be passed to spectroscopists whom Waddington would engage, and their spectra in combination would point to the molecular structure of the substance. The laboratory work often involved volatile, air-sensitive materials that Cliff would have to seal in glass or silica ampoules for the spectroscopists.

That arrangement became broader and stronger through the appointment of Waddington in 1969 to the chair of inorganic chemistry at Durham University. In the same year Cliff arrived in Durham, with his wife Janet and children Katherine and Stephen; he took up a lectureship in chemistry on October 1. Within a year, the laboratory accommodation for Waddington's research group was ready and had been occupied. The Warwick arrangement was re-established on a larger scale and last-minute sample preparations became commonplace for researchers desperate to fly to Grenoble and use INS beam time that suddenly had become available at the Institut Laue-Langevin. Publications show alliance of Cliff's laboratory skills with three other chemistry research-group leaders at Durham. Yet informal cooperation over a much larger number of groups came from his readiness to help postgraduates with awkward and delicate laboratory procedures.

Lecturing to undergraduates proved very much to Cliff's taste, allowing him to convey a lifelong love of chemistry and chemical reactions and providing an outlet for his inclination to deliver lecture-bench demonstrations. The lectures were recalled with pleasure by many of his listeners long after they had graduated and left Durham. A tutorship with the Open University helped him convey a fascination with chemistry at a more personal level until well past his early retirement in October 1998. His lecture-bench demonstrations acquired longevity also, triggered by undergraduates with influence in the University's student Chemical Society, who had managed in the late 1980s to persuade this modest man to deliver one of the Society's Tuesday-evening lectures on November 5. It was about explosive reactions, it included demonstrations and it was a great success. Soon his lecture featured in the University's outreach programmes for schools. Subsequent sponsorship from

the Salters' Company and the local section of the Royal Society of Chemistry brought regional fame. He was still delivering the lecture in 2004.

An active retirement included increased support for the Durham City group of the Rambler's Association as its secretary and as a regular leader of walks – often routed to illustrate local history. There was more time too for Cliff and Janet to spend with their four grandchildren, though sadly she died in 2006 aged 64. He was an active member of St Oswald's Anglican Church and later became an enthusiastic bell-ringer in local churches. He was secretary of his neighbourhood's Elvet Residents' Association and took a keen interest in the affairs of the wider locality.

In September 2014 a ramble Cliff had led to its end at Wolsingham was followed by a slip on a pavement in the village that severely damaged his cervical vertebrae. Complications arising from surgical repair left him unable to recover full mobility, though he was able to continue as the Ramblers' Durham City secretary and live courageously and independently at home in Church Street until three months before his death in 2019 on February 27. He is survived by Katherine, her two children, Stephen and his children.

Euan Ross, in consultation with Keith Dillon and Robin Harris.