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A personal view of the early days of NMR

I started my postgraduate studies under the supervision of J.A.S Smith in the University of Leeds in October 1956. In the previous month I attended the first meeting of the BRSG at Bangor, which brought together the very small group in the UK doing NMR and ESR. I think that all the NMR talks were on solids. John Smith had done his D.Phil at Oxford with Rex Richards, and in Leeds had built a spectrometer, operating only for protons, and at 0.38 T, i.e 16.435 MHz, and I used this to study single crystals of thiourea, urea and formamide. The main interest was to characterise in unprecedented detail the motion of the molecules in these solid samples. Three samples in three years may seem rather slow by today's standards, but in addition to the difficulties in getting spectra, all calculations were done on slow, mechanical computing devices. The first electronic, digital computer, a Ferranti Pegasus, to be installed in Leeds arrived in about 1958. This was an amazing advance, and allowed me to calculate the spectrum given by four dipolar coupled protons. In practice, the mind-numbing task of doing calculations on a mechanical device was replaced by the frustrating one of trying to feed a program and data on punched tape into the Pegasus.

John Smith started a project during my time in Leeds to build a high-resolution NMR spectrometer to study liquid samples. Commercial high-resolution spectrometers also became available at this time from Varian and eventually killed off any incentive to build one's own. John wisely turned his attention to developing and building NQR spectrometers.

I left Leeds in 1960 to spend two years in Liverpool working with Les Sutcliffe, Jim Feeney and Neville Boden. Les had received one of the first commercial high-resolution spectrometers, a Varian, operating initially at 40 MHz, but soon upgraded to 60 MHz. It was a fantastic learning experience for me, not least because Les and Jim invited me to join them in writing a textbook on high-resolution NMR, and this also led me to join them a couple of years later in the project, initiated by Les, to start the review series Progress in NMR Spectroscopy.

Les Sutcliffe also was responsible for getting me my next job, which was initially as a Research Assistant working for Ken Musgrave in Durham on fluorine NMR. Ken had obtained funding to buy a high-resolution spectrometer, and the policy at the time was that it must be British, and so I spent the next five years lavishing care and attention on an AEI 60 MHz machine, which had many good points (beautiful, polished wood face-plates on the magnet coils), but lacked either a flux stabilizer or an internal lock.

My time in Durham saw NMR becoming ever more important as an analytical tool for organic chemists, but I did not like the prospect of always being a junior partner in this kind of research. But the way that NMR was developing at the time seemed to make this inevitable. The way out of this impasse for me came when I read the paper in 1963 by Saupe and Englert showing the spectrum of benzene as a solute in a liquid crystalline solvent. This spectrum is dominated by partially-averaged dipolar interactions which can be used to investigate the geometry of the solute, and its orientational order in the liquid crystalline phase. The attractions to me were that analysis of the complex spectra required delving into the quantum mechanics of interacting spins and programming computers, both skills which I had learned as postgraduate in Leeds, and which stimulated my intellectual curiosity. The other big factor was that the experiments could be done on commercial, high-resolution spectrometers. I resolved to learn how to obtain the spectra of solutes in liquid crystalline solvents.

In 1967 an opportunity came to move to Southampton. They wanted to obtain a 100 MHz spectrometer, and thought that my presence there would improve their chance of getting a grant. I found myself part owner of a Varian HA 100, and crucially with an assistant who would run samples for the chemists whilst I could begin to devote my efforts to liquid crystalline samples, which I am still doing 42 years later.

The arrival of commercial, high resolution spectrometers into the UK in 1957 was exclusively into chemistry departments, and led to a rapid increase of those applying

NMR in Chemistry. There were soon more Chemists than Physicists doing NMR and this new community wanted conferences devoted to applications in chemistry. The NMRDG meetings arose to fill this need. The BRSG was, and is, still holding meetings, and many of its prominent members were based in Chemistry departments. The BRSG was started deliberately not to be a sub-group of any Learned Society, and membership was initially free I believe. Recently, it has become a sub-group of the Institute of Physics, and I suspect that few chemists now are members. Is such a polarisation between the BRSG and the NMRDG desirable?

My own involvement with the NMRDG started at its inception, and eventually I became Chairman in 1981. A Chairman in those days assumed office at the end of an International Meeting, in my case Exeter 1981, and left after chairing the next, for me Edinburgh 1983. Previous Chairmen had served for three years, but I was the first to do two. The change was in part to synchronize the RSC and EENC meetings so that they took place in alternating years. There were over 500 participants at Edinburgh, which was conveyed to me on my arrival by John Gibson as being excellent news. However, my first thought was how do we squeeze 500 into a lecture theatre holding 300? John had solved this by switching to the University Theatre, at least for the opening session and the other more popular ones. Edinburgh was a splendid venue, not least because of the tremendous support to the meeting given by the University and the City. The City gave us a splendid reception which featured dancing girls (and men) and whisky. The label NMR opened many doors in those days!