

Editorial

Alan Marshall: A Personal Foreword

I first met Alan Marshall in Fall 1969 when he joined the faculty of the Chemistry Department at the University of British Columbia (UBC) in Vancouver. I was then a senior graduate student in magnetic resonance in the group of Dr. Charles McDowell, the Department Head. Dr. McDowell (nobody addressed him as Charles) had told us that a bright young man had just arrived from Stanford and was expected to be very bright, a bit shy but also brash if need be, so watch out. Interestingly, he was listed as a 'Lecturer', rather than an Assistant Professor. The word was that he was too young, had not even finished his Ph.D., but that UBC didn't want to miss the opportunity of bringing him to Vancouver. To our delight, he announced that he was going to teach magnetic resonance in his first semester. The whole (25–30 strong) P Chem–biophysical contingent attended the first lecture. He announced that he was going to use Slichter (Introduction to Magnetic Resonance) as the main text, and after a simple introduction to nuclear spin properties, started with an introduction to density matrix mechanics The first 'simple' assignment was explaining why adding a neutron ($I = 1/2$) to ^{12}C ($I = 0$) leads to the ^{13}C isotope with $I = 0 + 1/2 = 1/2$, while the same does not work for the oxygen isotopes: $I = 0$ for ^{16}O but $I = 5/2$ for ^{17}O . It was clear that this was going to be very different from an earlier NMR course based on J.D. Roberts' organic oriented textbook. The course was a grind, with Clebsch-Gordon coefficients, angular momentum, rotation matrices and FFT's. Some couldn't do it, but to the die-hards, the lessons learnt and his sharp wit still resonate.

Alan soon became a popular teacher, aided a bit by some unusual visual aids. One of these was a big electric eel in a huge tank. As daily visitors we saw the eel flash once in a while, grow bigger, suddenly disappear one day, soon to be replaced by a smaller one. The scuttlebutt was that the eels were being used for some biomedical research, possibly shock-therapy for some annoying administrators! One year, one of his students linked up the eel tank at the Vancouver aquarium, so that their Christmas lights flashed on and off whenever one of the eels touched an electrode in the tank. That was also the year that Harry Kroto (future Nobel for buckyballs) spent a sabbatical year at UBC, and the only available desk was next to the electric eel tank! Only later was the eel mystery solved when we found out they were

being raised so Alan could isolate their acetylcholinesterase for one of his research projects.

Alan and I became friends because we both spent long hours at night in the laboratory, and I knew how to make good coffee. I recall vividly one evening Alan came upstairs to our lab (his lab was just underneath ours) and excitedly announced that he, along with Mel Comisarow, had just succeeded in detecting FT-ICR signals for the first time. The next morning we actually saw the peak, which looked exceedingly narrow, but was entirely reproducible. Then there was some disappointment and cursing when *IJMS* wouldn't accept their first manuscript titled: "Fourier Transform Ion Cyclotron Resonance Spectroscopy." {Editors note: The Journal was actually *IJMSIP* in those days and thankfully none of the current editors were in charge!!}. Eventually the report was published in *Chem Phys Letters* instead, and the rest is history.

Most readers of this journal know Alan mainly for his work on FT-ICR mass spectrometry. However, he also wrote a widely adopted 1978 monograph on **Biophysical Chemistry** that went through two printings and was translated into Russian. Moreover, he is a spectroscopist in the broadest sense, with publications ranging from NMR (radio frequency) to electron spin resonance (microwave), FT-IR, UV-Vis, absorption/fluorescence/Raman, gamma-ray, and X-ray diffraction. In fact, a significant part of his 10,000⁺ citations are for his non-mass spectrometry research, as briefly highlighted below.

Alan was one of the first to appreciate that a very large (>95%) part of FT spectroscopy is based on the use of the absorption signal alone. He introduced the combined technique, now known after him as DISPA: Dispersion-plus-Absorption. DISPA contains the advantages of combining both spectral components (absorption and dispersion) to provide an unambiguous determination of the mechanism of spectral peak broadening (e.g., whether a broad line consists of two overlapped peaks of different position or different width). For a description see his paper in *Chemometrics & Intelligent Lab Systems* 1988, 3, 261–275.

Alan has published some key papers in biological NMR. For example, he (for eukaryotes) and Peter Moore at Yale (for prokaryotes) did more than anyone else to establish the secondary structure (i.e., base-pairing pattern of small

ribosomal RNAs) as documented in one of his earlier reviews (*Biological Magnetic Resonance* 1990, 9, 55–118). This work still offers one of the few examples of an NMR determination of a macromolecular structure not previously known from X-ray diffraction. Some of his other NMR contributions that have stood the test of time are, e.g., the first method for obtaining the structure of a flexible molecule by use of lanthanide shift reagents (*JACS* 1973, 95, 1437). Later he applied the stored waveform excitation method to improve water suppression in MRI chemical shift imaging (see, for example, *J. Mag Reson* 1987, 72, 75). In the area of gamma ray spectroscopy, Alan provided the first theory for extracting macromolecular flexibility from perturbed gamma-ray angular correlations, among many other results (*J. Chem. Phys.* 1972, 57, 364; *JACS* 1980, 102 1460).

On personal side, Alan is one of the most helpful people at all levels, undergrads to faculty colleagues. Thus about 75 of his students and colleagues gave him a 50th birthday party where they presented him with a book of personal attributes. His students love him: three of his recent graduate students have already named their sons after Alan. A lot of us are grateful that our paths crossed.

This note is a particularly happy one because it is written at a time when Alan's research and other scientific activities have probably never been greater. Thus, while we all join in celebrating his past accomplishments, we are confident that the best is yet to come! Happy 60th birthday, Alan!

Naresh Dalal
Tallahassee, FL, USA