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## Obituary: Dr Robert (Bob) S. Bordoli: 20 February 1953–24 October 2000

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Bob Bordoli died peacefully at his home in Wilmslow on Tuesday 24 October 2000 at the age of 47. He had been ill since June as a result of a recurrence of a cancer that first struck him in 1997. During the intervening months he had undergone treatment at Christies Hospital in Manchester but, sadly, this had not been successful. He remained in good spirits throughout this time and was able to receive visitors up to the day he died. He and his family were grateful for the number of letters, cards and expressions of support that they received during his illness.

Bob Bordoli was known to many of us throughout his career, first at UMIST and latterly in Micromass, as 'Big Bob'. I have always believed that I coined that description but, like everything in science, many of us probably thought of the idea at the same time. The description did, however, fit Bob well. He was 'big' in so many ways, in his physical stature, in his scientific accomplishments, and in his capacity for collaboration, friendship and enjoyment. In his passing, Jenny, Ruth and Robert have lost a fine husband and father, I, and many others, have lost a good friend, and the 'mass spec' community has lost an excellent and wide-ranging scientist.

Bob Bordoli attended the Nicholas Chamberlaine School in Bedworth, Nuneaton, before entering the Department of Chemistry at UMIST in 1971, graduating with a BSc degree in 1974. His research at UMIST with John Vickerman was on the use of static secondary ion mass spectrometry (SIMS) to probe the surface chemistry of solids. As part of this work that led to the development of a fast atom bombardment (FAB) quadrupole mass spectrometer (*J. Chem. Soc. Chem. Commun.* 1981; 324), Bob constructed the first fast atom beam system for SIMS. His PhD work was completed in 1978 and examined in 1979 by Allan Maccoll.

By 1979, however, Bob had changed course slightly and was now working at UMIST as a post-doctoral fellow with the late Mickey Barber and Don Sedgwick on the development of the first FAB source for organic mass spectrometry. It was then that I first met Bob as a result of ICI's support of the research and my specific interest in obtaining spectra from sulfonated azo dyestuffs. The prototype FAB source was fitted on a modified AEI MS902 soon to be followed, through collaboration with Brian Green, by a commercial version on a reversed geometry VG ZAB-HF.

The group then proceeded to use FAB to obtain mass spectra from a range of hitherto intractable species (*J. Chem. Soc. Chem. Commun.* 1981; 325). This was the first, and in my view the most important, of Bob's many contributions to the development and application of mass spectrometry. The FAB technique led to a renaissance in mass spectrometry. FAB provided non-thermally induced structurally related fragmentation and a ready access to metastable information through 1st and 2nd field-free fragmentations on the MS902,

and MIKES on the ZAB-HF. Now molecules of biological interest could be studied without the need for pre-treatment and FAB-MS immediately became a key analytical technique for biochemists.

The paper on FAB by Barber, Bordoli, Sedgwick and Tyler contained a prophetic statement concerning 'the inadequacies of most mass spectrometers in terms of their energy focusing and ion source extraction of the high masses which this new ion source now makes possible'. Overcoming these problems, especially for the study of biological molecules, was the single theme that dominated the remainder of Bob's career and this was a task to which Bob's special combination of instrument development expertise and chemical problem solving ability made him uniquely suited.

In 1983, Bob left academia and made the short journey to South Manchester to join the mass spectrometry company, VG Analytical, now part of Micromass, as a development scientist. He quickly made his mark in the company and became involved with the development of magnetic sector instruments with improved mass range and greater sensitivity.

In 1983 and early 1984 Bob was involved in evaluating the ZAB-4F, the first commercial four-sector MS/MS system, for the structural determination of biological molecules ionised by FAB. With Mickey Barber and Brian Green he started to learn the rules for interpretation of MS/MS spectra of peptides. It was rare at this time to see Bob without an enormous pile of MS/MS spectra from which he was determined to obtain the maximum amount of information. He then became involved with the development of the ZAB-SE, with a mass range of 15000 Dalton at full sensitivity, and the ZAB-SE-4F, probably the longest ever commercial mass spectrometer! In all this work he never lost sight of the need to use the instruments to solve real problems arising from the practice of biological chemistry.

Bob made such an impact with this work that he was appointed Managing Director of one of the VG companies in 1987. This was probably one of the least enjoyable parts of Bob's career as it removed him, at too early a stage, from the work that he most enjoyed and where he felt that he could make his greatest contribution. Despite his misgivings, he spent about two years serving as MD before another corporate reorganisation gave him the chance to get back to what he enjoyed most.

At this stage Bob became product manager for the AutoSpec, moving on in 1991 to the AutoSpec-T, the tandem 'four-sector' MS/MS system with array detector. The AutoSpec-T really required two people to demonstrate it, and Bob Bateman recalls many 'demos' with Bob, requiring carefully coordinated efforts to get through without too many mishaps. He then worked on the development of the array detector on the AutoSpec-FPD, the development of the

ZabSpec-T 'four-sector' MS/MS instrument, the ZabSpec-FPD focal plane detector instrument, and the ZabSpec-Ultima, a 120000 resolution version of the ZabSpec.

There followed another prolific period of Bob's career when he became involved with Bob Bateman and John Hoyes in the development of the Q-TOF series of instruments and in using the instruments to solve biological problems. Once again he was showing his ability to drive forward both biological chemistry with the help of mass spectrometry and mass spectrometry instrument development through his interest in biochemical problem solving. In January 1996 Bob started to use the prototype Q-TOF for the analysis of biological samples by MS/MS and, at the ASMS meeting in Portland, Bob presented the first results from the Q-TOF, and co-authored the first paper on the Q-TOF (*Rapid Commun. Mass Spectrom.* 1996; **10**: 889). During 1996 and 1997 he was involved in most of the demonstrations and collaborations involving the Q-TOF. In 1997, at the ASMS meeting in Palm Springs, he demonstrated to a packed lecture room 'on-the-fly' data-dependent switching from MS to MS/MS in conjunction with nanoflow LC/MS. It was at Palm Springs that he first became aware of the possibility he had melanoma.

From 1998 to 2000, Bob focused on the emerging role of mass spectrometry in proteomics, and was involved in

coordinating the Micromass approach to this application, encompassing MALDI, nanoflow LC/MS and MS/MS on the Q-TOF, and the extensive use of software. He was particularly involved in evaluation of the new maximum entropy software for *de novo* sequencing of peptides. Most recently, he had become involved with the evaluation and development of the MALDI source on the Q-TOF.

Bob's industrial career has led to over 50 published papers and to numerous conference contributions – often the key indicator for staff from instrument manufacturers. These were in addition to the many papers that had resulted from his UMIST career. Bob was an excellent lecturer and, as a result, he became in many ways the face of Micromass to the scientific community.

Despite the long hours that Bob worked, and the travelling that was so much part of his job, he was a keen family man and he delighted in telling stories of travel with the family. In his days at UMIST, he was interested in hockey – we thought this was mainly because hockey was Jenny's sport. He also enjoyed tennis and occasional sailing but his main hobby remained mass spectrometry and its applications.

John Monaghan  
8 November 2000