

## Editorial

# John H. Beynon: the Swansea years 1974–1986

In 1988 Robert Boyd and I were guest editors of a special issue dedicated to John on the occasion of his 65th birthday. This was to honour his seminal contributions to mass spectrometry. At that time we only briefly reviewed John's Swansea years; now I have the opportunity to recall what I remember of his time at Swansea. Even though I joined his research unit in autumn of 1977 and spent a couple of years in industry, a record of these times was captured through the annual group photographs. The photographic record is incomplete; many visitors came and went without being immortalised in these pictures. This article is a brief account of my own recollections of working with John. Using this set of photographs, a subset of which are reproduced here, as a time line I recollect those years. His scientific achievements are in the Literature for all to see. In this article I will look over those students and scientists who joined in his endeavour.

Great care was taken during the week or two before a group photograph was taken to ensure that everyone was present for "the photograph". This fitted in with John's sense of rigour, and ensuring a complete record was maintained. Thirteen people appear in the first Swansea group photograph in 1978 (see Fig. 1); but the story starts before.

After John's election as a Fellow of the Royal Society of London in 1971 he was offered one of the newly created Royal Society Research Professorships, tenable at any UK university. This was a time of establishing and building a new research group, but where? John collaborated with many scientists. Keith Jennings (Warwick University) was one of John's longest friends and they conducted collaborative experiments on the equipment Keith had at Warwick. However, Professors Howard Purnell and Andrew Pelter of the Chemistry Department, Swansea University were very keen to get John to his alma mater in Swansea. Howard was a close friend of John's; both were born and brought up in the Swansea valleys. I also suspect there were other universities competing to hire John's talents but the Principal (Professor Robert Steel) and Registrar (Aneurin Davies) of Swansea university were keen to get their man. John frequently recounted the written offer from Aneurin Davies that "the University College of Swansea would assist in any way possible to...". This catch all phrase was frequently hauled out on any occasion that merited more assistance.

So John came to Swansea in 1974 but it took two years before he had laboratory space and a mass spectrometer. In

1976 the work began. Space was made available in the rear of the Chemistry building, in typical Welsh style it was referred to as "the extension", where a laboratory was shared with Dr. Geoff Stedman. One of John's close friends in the department, Mr. John James, had also worked with him at ICI Manchester. He was the superintendent of laboratories. Direct access to the management of the chemistry department ensured that progress would be fast. John set about building staff and research student numbers.

In 1976 John's first mass spectrometer came into the laboratory. Varian MAT had been developing an ultra high resolution mass spectrometer, codenamed SM1, in their Bremen factory. John secured a deal by some means or other with Karl Maurer, of Variant MAT. Varian's development would not proceed to a commercial product and the spectrometer was up for grabs. It was a large double focusing spectrometer, cost John around £20,000, and soon became known as "The VARIAN". During the year John had hired his first PhD student Janet Harris (from Kent) and later Stuart Howells (from Blackwood, South Wales) and Chris Porter (from Portskewett, South Wales), see Fig. 1. As much of the research was instrument based it was essential to sort out technical support. A deal was cut with John James and one of chemistry's technicians, Sid Davies, was transferred to John's newly formed Royal Society Research Unit (RSRU). Sid was keen as mustard and quickly integrated into the RSR. Whilst the SM1 was designed as a prototype electron impact double-focusing mass spectrometer it was rapidly modified to conduct ion kinetic energy spectrometry (IKES) experiments. Stuart Howells was assigned to the instrument, with Sid in tow building electronics as required. Within a short space of time results on IKES and peaks shape studies emerged.

During these early days a young and keen visiting professor was attracted from Guelph, Ont., one Dr. Robert K. Boyd (Bob). He worked with Stuart on the development of the IKES technique. In the meantime John had a major grant application in collaboration with Dr. Dudley Williams (Cambridge University) to purchase a ZAB mass spectrometer. As the story goes VG Micromass (Manchester, UK) were developing a brand new high-resolution double focusing mass spectrometer. The designers of the spectrometer at VG, Robert Bateman and Brian Green and their team, were wooed by John to deliver the first instrument to him and



Fig. 1. Royal Society Research Unit—1978. (Back row) C.J. Porter, A. Mendez-Amaya, J.R. Gilbert (Essex), S. Howells, M.H. Bozorgzadeh, J.E. Szulejko. (Middle row) G.W. Trott (Wollongong), M.H. Player, J.H. Beynon, J.A. Harris, A.G. Brenton, S.B. Davies. (Front row) J.L. Wiebers (Purdue).

Dudley. John also convinced them to construct the instrument with “reversed geometry” so that mass-analysed ion kinetic energy spectrometry (MIKES) could be undertaken. This enhancement of IKES had first been achieved by John and his group at Purdue University. After IKES this was the next important development of tandem mass spectrometry. Since John was interested in complex experiments for the ZAB, he persuaded VG to include a host of extra features for the instrument. These included collimating slits; variable z-restrictors; extra beam monitors and a beam locking system for MIKES studies to minimise magnet drift during a long signal averaging process. The instrument was to be shared between the research groups of John (in Swansea) and Dudley (in Cambridge) but the instrument was to be located in Swansea. Roger Morgan (originally from Hereford, and trained in University College London by Allan Maccoll) was hired in early 1977 as John’s first postdoc to run the new ZAB. More students joined the group, Aaron Mendez-Amaya (Venezuela), Mohammad Bozorgzadeh and Jan Szulejko (Swansea). Ray Gilbert (Essex University) also started a collaboration with John and frequently visited the laboratory. Apart from publishing research papers, John and Ray published a book “Application of Transition State Theory to Unimolecular Reactions: An Introduction” [1].

I joined the group in September 1977. I had just completed my PhD studies in *Positron-Atom Collisions* and knew of mass spectrometry as a useful method for determining the compositions of gas mixtures. I vaguely knew that it was of relevance to the chemical industry; I had much to learn. It was extremely exciting when I realized that a mass spectrometer, which I had previously thought had been built solely for the use of chemists, could be a physical labora-

tory in its own right. More than that, someone else built the instrumentation to very professional standards, which gave unheard of performance and sensitivity. John’s laboratory was like Aladdin’s cave as far as I was concerned. At the same time Maisie Player was hired as John’s secretary and organised his work life until he retired. Maisie continued on after John but missed the hustle and bustle.

During 1978 Roger Morgan left to take up a post in mass spectrometry with Shell (Thornton, UK). Visiting scientists Geoff Trott (from Wollongong, Australia) and Joyce Wiebers (Purdue University, USA) came to the laboratory. Geoff Trott was an electronics engineer looking for a project; he turned to modifying the MIKES computer source code which resided in the VG PDP8e data system. He was also a dab hand at prototyping new circuits, which he called flying circuitry, and soon had projects up and running to fine tune the performance of the ZAB. Joyce Wiebers (J.L.) started her studies on DNA, which at that time were performed by pyrolysing the DNA on a solids probe into the electron impact ion source. This quickly dirtied the ion source. Mohammad Bozorgzadeh and J.L. conducted collision induced dissociation mass-analysed ion kinetic spectrometry (CID MIKES) on her DNA samples. Research started to move on a pace as we were all employed on research only contracts. In 1979 the RSRU had expanded greatly. There were seven PhD students, four postdocs, five visiting scientists and Frank Harris moved from the Physics department to the RSRU in 1979. It was not long before John had gently squeezed Geoff Stedman’s group from the shared lab to make way for all the new equipment that was to come.

Ian Howe was hired to become an academic staff member, whilst Frank Harris brought his photodissociation project to

the ZAB mass spectrometer [2]. John Bowie did negative ion studies with Jan Szulejko and Zaretskii brought a large collection of unique steroids on which he wanted to characterise the stereoisomers by using CID MIKES scanning. Zaretskii, in fact, collaborated with the Swansea unit until the early 1990s and achieved his meticulous aim of being able to separate stereoisomers by CID MIKES and consecutive metastable ion scanning. A long standing collaboration with colleagues in Yugoslavia continued and a young student Bogdan Krajl, from the Jose Stefan Institute, Ljubljana came to study consecutive ion scanning. During that time we had several journeys to VG Micromass to further modify the ZAB for angle resolved scanning and to add a second electrostatic analyser for consecutive ion scanning and other more esoteric scans.

Close ties were maintained between Swansea and Keith Jennings' group; once or twice a year a bus journey was organised and each group would make exchange visits, with a day of seminars. Additionally a smaller group would visit Keith and I remember one trip in 1978 when John, Maisie, J.L., Roger Morgan and I visited Keith's lab. After a long day we returned on a rainy winter's night. John had driven us to Warwick in his red Range Rover. I became aware of John's fast driving as we got close to Swansea on the trip home. It was a Friday night and this was John's night out in the rugby club with his mates. In 1978 licensing laws were such that alcoholic drinks would stop being served at 10.30 p.m. sharp. At 8.30 p.m. we were over 40 miles from home. The narrow roads leading back to Swansea were not lit and cast in rain and shadows. John suddenly started to toggle his lights off then on so that he could see if any oncoming cars were present. This enabled him to cut all corners and speed our journey. The experience of fast driving on a cold and dark night unnerved me as a young postdoc; we were all silent and glad we made Swansea in good time for John's drink in the rugby club and us to safely make our way home.

The large group in the RSRU almost exclusively wanted to work on the new ZAB. Surely this instrument could not support all these experiments. To solve this problem a 24-h shift system was instituted. Each week the lab meeting would have a highly contested session where instrument times were booked and argued over. I did this job, amongst many others. Apart from 24 h work scheduling I was often called on to help fix the machine at any time during the week or weekend. Papers flooded out at a rate of 20+ per year.

Lab meetings were held twice weekly; one to discuss the state of each instrument and another to hear a paper presented to the whole group. These were stimulating meetings where much was said with often something learnt or discovered. John also made time to see each student, together with his postdoc lieutenants in tow. This was an effective system for generating results and enthusiasm.

In early 1980 I left the RSRU to take up a post with Kratos Analytical Ltd (Manchester) as a scientific engineer. However, before I left Carol Bradley came to study small peptide systems working with Ian Howe. Whilst the rest of group

concentrated on their physical mass spectrometry studies Carol was focused on this other field of biological mass spectrometry. The main thrust of the research in 1980 was towards photodissociation studies and the experiment that Frank Harris brought was working extremely well and producing papers. It was a tedious experiment, ion signals were extremely low but several groups throughout the world were copying this design and setting up their own photodissociation work. In 1980 visitors from Canada (Ray March), Brisbane (Russell Evans) and Belgrade (Ted Ast) were received.

In 1981 several members left the group but were replenished by Chris Herbert as well as a visiting professor from Wollongong (Peter Bolton). An excellent workshop technician, Des Thomas, was brought on board to maintain and construct the equipment in laboratory. Des was a local councillor and magistrate, hence he spent a significant amount of his time on civic duties. However, this turned to be a benefit as Des would work rapidly whilst in the RSRU, to ensure he could perform his outside duties, and Des's ability became apparent. More instrumentation, often old and requiring attention was brought into the lab at this time, especially an old MS9 donated by BP Ltd. In 1982 Eric Kingston came over from the laboratory of Jim Shannon (Sydney) to postdoc. Eric was a busy chap and interested in all lab activities, sometimes to the annoyance of others, because he was very inquisitive. Eric refurbished the MS9 with Des and became involved with most of the work going on.

1982 saw several new faces arrive. Mila Rabrenovic and Ted Ast came over from Belgrade to study CID MIKES of small hydrocarbons. Frank and John were awarded funding from the Paul Instrument Fund (Royal Society of London) to construct a hybrid mass spectrometer comprising a quadrupole coupled to an electrostatic analyser. This was a new tandem mass spectrometer. Bob Boyd (Guelph) returned to study linked scanning and angle resolved mass spectrometry. In 1981 John had hoped Ian Howe would run his laboratory. This was not to be the case and Ian moved on. John persuaded the university that he could not survive without a new academic post being created and he phoned me regularly in an attempt to persuade me to apply for the "new post". I was reluctant for many reasons, but I was finally persuaded to attend for interview as it was an excellent position where I could devote my time to research. One hundred and twenty-seven applicants applied for the post, and one wonders if they knew what they were letting themselves in for. I was the successful candidate, however and quickly became involved with most of the work on the ZAB. The other areas were left to Frank to organise and run. John always wanted maximum output and I was happy to help in his dream. That year (1982) the triennial International Mass Spectrometry meeting was held in Vienna and Swansea was successful in its bid to hold the next meeting (1985). John Todd was the UK representative on the international committee and had helped secure Swansea as the meeting site. I was oblivious to the consequences of this decision which eventuality involved me in a tremendous amount of work,





Fig. 2. Royal Society Research Unit—1983. (Back row) T.G. Morgan, M. Guilhaus, F.M. Harris, E.E. Kingston, S. Singh, D.W.W. Thomas, M.S. Thacker, A.G. Brenton. (Front row) G.W. Trott (Wollongong), S.B. Davies, M.S. Kim (Seoul), M.H. Player, J.H. Beynon, M. Rabrenovic, T. Ast (Belgrade).

as the small group of local organisers in Swansea would end up doing everything!

If I were immodest I would claim that the resurgence of the RSRU in 1983 (see Fig. 2) was due to my presence and the synergy created when working with John. Old friends visited again and new friends were made. Myung Kim came for a sabbatical from Seoul as a prelude to his purchase of a ZAB. He was full of energy and ideas and Mila worked on problems involving multiple collisions with Myung. Michael Guilhaus moved from the lab of Jim Shannon, following Eric Kingston. He brought Aussie enthusiasm and integrated well into the group, bringing all the students along on their projects. At this time fast-atom bombardment (FAB) MS was in its prime and the RSRU worked on FAB generated cluster ions, as did several other labs. Mila's husband, Zoran Lausevic, is a chemical engineer and was interested in glassy carbon. We tried FAB on this compound but failed to notice (or overlooked) any ions at  $m/z$  720. Little did we know how important carbon would be.

John's research was booming and its funding was based on a rolling grant from EPSRC which gave continued funding over a four year cycle. The time was approaching for a renewal. Much of the work on the grant proposal had been done by John and Frank before I returned but much consternation was occupying John whether the next submission would be successful. Whilst John's research was thriving the funding council in the UK were more fickle. The rolling grant would not be renewed! The disappointment could not be easily seen but lay beneath the surface. John shrugged it off seeking funding in other ways. It could have been a struggle to survive; the Royal Society funding acted as a safety net, and fortunately other applications to the funding coun-

cils were successful. The die was cast, however, and John could see the future ahead. Even so research went on a pace.

1984 and 1985 were more and more consumed by the demands of organising the Swansea international mass spectrometry conference, but research still went on 24 h a day on the ZAB. Collaborations were made with John Hasted and others. High resolution ion studies on small molecules and charge exchange were made at high energy resolution. At this time we hired Dr. Emmanuel Kamber as a postdoc and later Wilson Hormis as a student; both were Iraqi nationals. At that time the British government were close to the Iraqi regime of Saddam Hussein and Dr. Kamber was having difficulty with his visa. Both John Hasted and I saw the unfairness of this. Emmanuel was an Assyrian Christian, and subject to political harassment. The British government decided to try to deport Emmanuel back to Iraq, but both John Hasted and I fought it. Eventually, after contesting this judgement in court, the British government backed off. A few years later the political climate reversed and Emmanuel was now a most welcome guest. In the meantime he had decided that the USA was for him and he went to Michigan to teach physics.

1985 was the Conference year. It was organised by John and he chaired the conference. In the background we toiled day and night; John, Frank, Maisie and I. It turned out to be a great success attended by over 1100 paying delegates and had a hugely successful manufacturers' programme, held in an old gymnasium on campus. Even the weather was wonderful. Delegates enjoyed stand seats at a rugby match, as well as Welsh culture in Dylan Thomas's "Under Milk Wood". For me the conference took a toll and John reluctantly let me spend a two month sabbatical in

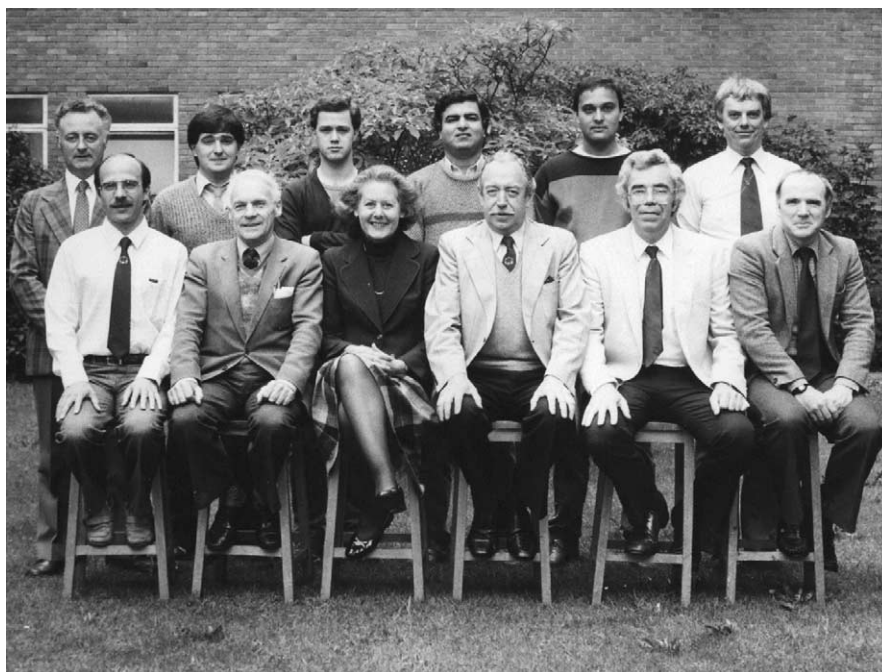


Fig. 3. Royal Society Research Unit—1985. (Back row) F.M. Harris, P. Jonathan, R.G. Kingston, E.Y. Kamber, S. Singh, D.W.W. Thomas. (Front row) K. Vekey (Budapest), S.B. Davies, M.H. Player, J.H. Beynon, R.K. Boyd (Guelph), A.G. Brenton.

Peter Derrick's laboratory in the University of New South Wales. Over John's last year (1985–1986) the RSRU concentrated on the work of visitors and my interests in high resolution translation energy loss spectroscopy and Frank's on photodissociation. Through our weekly lab meetings a new design for a high resolution energy loss spectrometer was invented [3]. Some of the theory of that design and subsequent designs is presented in a theoretical paper in this special edition. During the final years new students arrived, with Philip Jonathan being one of John's last students. He is a highly talented mathematician but quickly took to experimental work on the ZAB. In 1985 we again applied for funds from the Paul Instrument Fund, successfully, to build the high resolution double electric sector spectrometer. Karoly Vekey spent time in 1985 and we investigated a technique which we called electron-capture induced dissociation (ECID) (Fig. 3).

In 1986 John shocked us with his decision to retire at the tender age of 63. As ever he left the lab in wonderful shape with continued funding for two postdocs, Dr. Mahmoud Hamdan and Dr. Bill Griffiths, who worked with Frank and I. When John said he would retire he did; he moved on. He threw himself into a new project with Gunter Heyden

and together they launched *Rapid Communications in Mass Spectrometry* which became one of the most successful MS journals.

This story is told partly through a series of lab group photographs. Each time I look at the photographs which hang near my office they prompt some thoughts and memories. John's long lasting interest has been his photography, in which I can assure you he is still engaged.

## References

- [1] J.R. Gilbert, J.H. Beynon, *Application of Transition State Theory to Unimolecular Reactions: An Introduction*, Wiley, 1984.
- [2] F.M. Harris, E.S. Mukhtar, I.W. Griffiths, J.H. Beynon, *Proc. R. Soc. Lond.* A374 (1981) 461.
- [3] J.H. Beynon, A.G. Brenton, L.C.E. Taylor, *Int. J. Mass Spectrom. Ion Proc.* 64 (1985) 237.

Gareth Brenton  
 Department of Chemistry  
 University of Wales Swansea  
 Swansea, SA2 8PP, UK  
 E-mail: g.brenton@swan.ac.uk