1996 Mineralogical Society — Schlumberger Award

Presentation by the President, Professor A. H. Rankin, to Professor C. M. B. Henderson, 8 January 1997, at the University of Cambridge

In 1990, through generous support from Schlumberger Research in Cambridge, the Mineralogical Society instigated a new award "To recognise scientific excellence in mineralogy and its applications". In previous years the award has been made to a glittering cast of mineralogical stars from home and abroad. This year it is particularly pleasing that the Society has chosen to honour the achievements of one of its strongest supporters and Past President, Professor C.M.B. 'Mike' Henderson.

Mike's professional scientific career has spanned some thirty five years in academic establishments within the UK. He graduated with first class honours in Chemistry and Geology from Durham University, going on to combine these two subjects with a PhD in

Photo: Courtesy of D. Simons, Dept. of Earth Sciences, Cambridge

Prof. C. M. B. Henderson (*right*) receiving the Mineralogical Society–Schlumberger Medal from A. H. Rankin.

Geochemistry from Imperial College in 1964. After his PhD he moved north to join the Geology Department at the University of St. Andrews, as a lecturer in Geochemistry. In 1966 he came to Manchester University as a NERC Research Fellow in experimental petrology. This marked the beginning of his long, continuing and distinguished association and academic career within the Department of Geology. In 1985, Mike was promoted to Reader and to a personal chair of petrology in 1990.

Mike's early research interests were in the fields of igneous geochemistry and petrology with his first publication in the *Mineralogical Magazine* on *The minor element geochemistry of leucite and pseudoleucite*. He has maintained a strong research interest in these fields but his move to Manchester opened new doors and offered great potential for the development of novel research directions. This allowed Mike's science to straddle the boundaries between mineralogy, materials science and solid-state chemistry. Mike's time at Manchester has borne fruit in a string of influential papers on crystal chemistry, mineral physics and experimental petrology. Perhaps the most important feature of his research has been the perceptive and early recognition of the potential for applying synchrotron X-ray techniques to problems in mineralogy, with some spectacular successes.

It is always hard to break into a circle, but the storage ring at the synchrotron radiation facility at Daresbury, where Mike is now almost a permanent fixture, was no barrier to his interests and vision. Mike is an acknowledged world leader in synchrotron X-ray methods and their mineralogical applications. He is an enthusiastic proponent of these methods, and the list of young and established scientists who have benefited from Mike's wisdom, perception and collaboration is impressive; these include the last two recipients of the Society's Max Hey medal. I am privileged to count myself amongst the list of humbler users, beguiled by the mysteries of the storage ring with its intense beam of white light and groups of scientists huddled in 'hutches' surrounding it, often working throughout the night; it has an almost Tolkeinesque quality to it.

Mike, in recognition of your oustanding contribution to mineralogy, especially in the fields of crystal chemistry and synchrotron radiation studies, and on behalf of the Mineralogical Society, I am delighted to present you with the Schlumberger Medal for 1996. Very many congratulations.

Acceptance by C. M. B. Henderson

Mr President, Andy, I was thrilled to receive your telephone call a few months ago telling me that I had been selected to receive the 1996 Schlumberger Medal. I felt honoured then, and more so now that it is in my hand.

I have been incredibly lucky over the years. My first piece of good fortune occurred right at the beginning of my University career at King's College, Newcastle, when it was still part of the University of Durham. I went to university to read honours chemistry and my tutor advised me to take subsidiary geology. I knew absolutely nothing about the geosciences, having dropped geography in favour of biology at the end of my first year at grammar school, and I had never been a collector of minerals or fossils and, being physically lazy, had never climbed or fell-walked. I thoroughly enjoyed the geology course and eventually chose to do combined honours in chemistry and geology. Not surprisingly, I most enjoyed the petrology and mineralogy courses (there were no formal geochemistry courses in those days) and my particular love was that wonderful book *The Evolution of the Igneous Rocks* by N.L. Bowen, the father of experimental petrology and mineralogy. I also pored over the recently published Tuttle and Bowen monograph *Origin of Granite in the Light of Experimental Studies* and I pestered my lecturers Hugh Battey and Bert Randall to help me to decipher the more obscure bits.

My second bit of good luck was to choose to go to Imperial College, London to do PhD research on the geochemistry of a gabbro-nepheline syenite-quartz syenite complex supervised by John Butler. As well as nepheline, the undersaturated rocks contained pseudoleucites and sodalite and this was the beginning of my long interest in feldspathoids which evolved into synthesizing many rare element analogues of sodalites, nephelines and leucites and studying their structures and phase transitions. At Imperial College I met Ian Carmichael who became an informal supervisor until he left for the USA. Through Ian I met William Scott MacKenzie; Mac for many years played a crucial role in influencing and advising many young mineralogy and petrology researchers and I am indebted to him for his support.

I took up my first lectureship at St Andrews University where I met the first of my long-standing research collaborators – Fergus Gibb. We met on a field trip to the Shiant Isles led by Harald Drever and Alex Deer. Some of you will have heard stories about how the islands are overrun with seabirds, which was nice, and rats, which was horrible. On the first night there, in our camp, we were woken by a commotion from inside Fergus's tent which apparently recorded

Fergus despatching a trespassing rat with his bare hands – or did he use a geological hammer? Such valour showed that he was a good man to know. I quickly moved on to Manchester to join Mac and David Hamilton as part of the Experimental Group. Derek Taylor was then a NERC Postdoctoral Research Fellow and we started a collaboration which lasted many years, studying mainly sodalite and nepheline group minerals. Fergus Gibb eventually turned up in Manchester and we started our work on Scottish differentiated alkali basalt sills using our Winkie diamond drill to obtain continuous cores through the Dippin, Lugar and Shiant Isles sills. Interestingly, the olivine phenocryst distribution in these sills shows little signs of the magmas having convected.

During the NATO feldspar conference at Manchester in 1972 I met my American colleague Ken Foland, and since then we have done much collaborative research on subvolcanic, syenite ring complexes in which his Ar, Sr and Nd isotope work is integrated with my mineralogical and petrological studies.

Things really took off in the 1980s with my meeting Neville Greaves at the Daresbury synchrotron. I had started work on studying glasses as models for the structure of silicate melts and the element specific EXAFS technique seemed to have great applicability to such amorphous materials. Neville Greaves combined expertise in glass structures and EXAFS so was an ideal collaborator. The glass work soon expanded and over the last few years, in collaboration with many others (John Charnock, Gordon Cressey, Paul Schofield, Terry Seward, Gerrit van der Laan, Tony Bell, Simon Clark) we have used both XAS and synchrotron powder XRD to study local or long range structures in crystals, glasses, high-temperature hydrothermal solutions, and compressibilities and pressure-induced phase transitions using diamond anvil cells. In this work particular mention should be made of the two Simons – Kohn and Redfern. I learned the advantages of magic angle spinning NMR from Simon Kohn, and Simon Redfern re-awakened my interest in displacive phase transitions, although I had to learn a new vocabulary of terms such as ferroelastic, coelastic, and Landau theory. Tony Bell worked tirelessly on doing Rietveld structural refinements of numerous leucite-type phases. These three active and enthusiatic young scientists kept me at it and the publication rate multiplied and work continues apace. My most recent mineralogical research was prompted by meeting Kevin Knight at Daresbury. He persuaded me to apply to do some neutron powder diffraction at the Rutherford-Appleton Laboratory and preliminary work with Kevin led to high-temperature work on cation ordering in olivine with Simon Redfern and Bernie Wood which is producing fascinating results suggesting that Fe-Mg olivines become more *ordered* as temperature increases.

I have been particularly fortunate to have the help, support and patience of all these researchers. The whole is undoubtedly greater than the sum of the parts and I thank them all for their crucial contributions.

I have loved doing my research over the last 35 years. I can only repeat what many other medallists have said in that I consider myself fortunate in having been paid a salary to indulge my sense of curiosity, often in following somewhat obscure lines of research. Things are significantly different now in that one's research is assessed in the terminology of 'quality assessment' and 'relevance' – note the inverted commas. A frequent yardstick for judging whether a research programme is worthwhile is whether or not a hypothesis is being tested, and, in addition, one hears some research being dismissed as being 'equipment led'. Over the years I have found that an occasional 'suck it and see' approach can be incredibly fruitful, leading to intriguing and unexpected results. I have also found it enormously stimulating to try out new 'state of the art' techniques – as geologists we work with enormously complex materials and taking a chance with such methods can provide important new ways of looking again at old and unsolved problems as well as at new research challenges. Thus, I advocate a more open-minded approach to research funding, but I fear that this is less likely as funds continue to shrink. My last hobby horse is that we should all spend more time in the laboratory or at the workbench. Research management activities *via* students and assistants might keep things moving steadily but I believe that the skills and experience *we* have gained over the years are best applied and advanced by our being up at the 'sharp end' as well.

So much for pontification. Andy, thanks again to you, the Mineralogical Society, and Schlumberger for this singular honour. I hope I have plenty of research-active years ahead of me so that I can continue to justify the faith you have shown by the award of this fine medal.