1993 Mineralogical Society–Schlumberger Award

Presentation, by the President, Professor C. M. B. Henderson, to Professor I. Parsons, 6 January 1994, at the University of Glasgow

THE citation for the Mineralogical Society–Schlumberger Award includes the words 'to recognize excellence in mineralogy and its applications' and 'evidence of such excellence should be in the form of published work by a currently-active scientist'. Our 1993 nominee certainly lives up to these requirements, and it gives me great personal pleasure to confirm that Professor Ian Parsons is our Schlumberger medallist for 1993.

Ian Parsons and I first met in early 1964 when I visited the Manchester Geology Department to use the X-ray diffractometers — he was then an NERC (or was it DSIR?) Fellow and claimed to be a 'Feldspathologist'. He has remained true to this first love but it has not stopped him widening his horizons as is attested in the award of this medal

today. When we met, Ian had just been offered an Assistant Lectureship at Aberdeen University and I was amused when he told us that his first lecture course would be in Stratigraphical Palaeontology; although I note that he doesn't mention this teaching in his current C.V. Perhaps it goes without saying that his contributions to that area of scholarship did not add significantly to the case for this award!

Ian studied for his B.Sc. and then Ph.D. at Durham University. His research topic was a study of the Loch Ailsh syenite intrusion, during which time he first developed his love of feldspars and of course Scotland. During his short stay at Manchester, William Scott MacKenzie introduced him to the techniques of experimental petrology and this experience led him to carry out much experimental work on exsolution and Si–Al ordering in alkali feldspars. At Aberdeen, his lectures on Palaeontology must have been satisfactory because he was quickly promoted to a Lectureship, and then ultimately to a Personal Chair. In 1988 he transferred to Edinburgh University during the UGC Earth Sciences Review.

Following his initial research on Scottish syenites, Ian embarked on field and laboratory work on perhaps the most exciting of syenite provinces, namely the Gardar province in Greenland. These links to Greenland led subsequently to work on several layered intrusions and many of you will know about his ideas on the formation conditions of the bizarre upside-down layering at Klokken. In about 1980 he started an extremely fruitful liaison with William Liddell Brown on microtextural studies of feldspars. Their TEM work on feldspars demonstrated that this technique could be as important in petrology as in mineralogy and crystallography. More recently he and his co-workers have been on the quest for holey (note the e) feldspars and they are now linking their petrological and TEM studies to laser ablation microprobe work. Thus they have shown that $^{40}Ar/^{39}Ar$ techniques can be used to date perthitic alkali feldspars which have undergone partial sub-solidus re-equilibration and hydrothermal alteration. This work clearly demonstrates the importance of a multi-technique approach to studying complex petrological amd mineralogical problems.

Professor Parsons has published in a wide range of prestigious journals, has contributed to the production of several Greenland Survey geological maps, and is co-authoring J. V. Smith's revision of his magnum opus on *Feldspar Minerals*, along with Bill Brown. As well as carrying out his own research, he has supervised many successful Ph.D. students, several of whom have gone on to academic and research careers. He has also found time to act as Head of Department at Aberdeen and now at Edinburgh. He has served on many NERC panels, on various editorial boards, and is currently the UK Editor for *Contributions to Mineralogy and Petrology*. He gave the Mineralogical Society Hallimond Lecture in 1977 and was elected a Fellow of the Royal Society of Edinburgh in 1984.

Ian combines his dedicated approach to science with an entirely straightforward manner. He is an excellent communicator, liked and respected by all for his penetrating good sense. Ian, on behalf of the Mineralogical Society, I am pleased to present you with this handsome silver medal in recognition of your excellent past and ongoing contributions to mineralogical and petrological research.

Acceptance by I. Parsons

After three Schlumberger awards a clear pattern is emerging in acceptance speeches. Largely autobiographical, they begin with an assertion that the recipient has nothing of interest to say on the philosophy and nature of mineralogy, and then go on to expand on both of these subjects. I shall stick with this tried and tested formula. After a lifetime devoted to the belief that medals were things won by other people, it is a delight to suddenly hear, out-of-the-blue, that you have been selected for such a prestigious award, and a particular pleasure to receive it here in the University of Glasgow, in a Department I know well, and which was the source of the only other medal ever won by a living member of my family.

My research career began at Durham University, where in 1960 I started a Ph.D. on the Loch Ailsh syenite, in the Assynt district, supervised by Henry Emeleus, an outstanding igneous petrologist, particularly in matters of field relationships and structure. Henry was directly responsible for kindling my two main interests, feldspars and alkaline rocks. The Loch Ailsh intrusion is the world type locality for the monomineralic alkali-feldspar-rock, perthosite. Confronted with this, I decided I had better learn a bit about these rather complicated minerals. Henry had already collaborated with Joe Smith on a study of some feldspars from Slieve Gullion. They tried to relate the structural state of the crystals to the width of the ring dyke, in the belief that both should be related to cooling rate. When they found that the relationship was not straightforward they postulated that water present in the cooling rock had somehow influenced the final products. They were completely right. Although we now know much more about the polymorphism of feldspars, and the mechanisms and kinetics of their intracrystalline reactions, it is fair to say, in a nutshell, that feldspars that have had 'dry' cooling histories can be used as cooling-rate-meters, whereas those which 'see' a fluid are particularly sensitive to dissolution–reprecipitation reactions which hide earlier events.

By the end of my Ph.D. I was hooked on feldspars and obtained a fellowship to continue the work at Manchester where W. S. MacKenzie had established a reputation as a real feldspar expert and was building up an experimental petrology lab. Mac figures large in the biographies of the two previous Schlumberger medallists and in my case broadened my horizons by suggesting that I should make my own feldspars. Iron feldspars looked interesting, and sure enough, iron microcline, bright yellow but otherwise looking just like the real thing, with pretty 'tartan' twins, was readily synthesized. This knowledge of hydrothermal techniques got me a lectureship in Aberdeen, where T. C. Phemister was looking for someone to develop experimental equipment. Aberdeen had a fearsome reputation for taking instruction in mineralogy very seriously, and I quickly found myself teaching a great deal of crystallography. All second-year students spent 12 hours measuring a crystal, hunched in the twilight over a dimly lit goniometer in a special room, like so many monks at work illuminating manuscripts. Good students found it a fascinating challenge; others might struggle for hours to set up the prism zone, whereas I found that with practice I could set up the most obscure inclined zone in a flash, like a conjuring trick. No-one, I expect, thinks that we should still be teaching mineralogy in that way, but I certainly regret that the pace and scope of modern courses gives little time for treatment in depth. Teaching in Aberdeen was done to exacting standards and from several colleagues I learned much that became of routine value in my research. I was also enrolled by Bob Howie as a sub-editor of Mineralogical Abstracts, which ensured that for many years I read every single abstract in experimental petrology twice, as well as benefitting from Bob's legendary geological intelligence-gathering activities.

With NERC support my small experimental lab grew slowly. My greatest satisfaction came from a study of the alkali feldspar solvus, much of which was carried out by my first research student, Peter Smith. He set out to do a proper reversed study of the effect of small amounts of anorthite on the solvus (which has still not been achieved) and began by redetermining the binary solvus. He immediately found that the composition of each feldspar depended on the bulk composition of the starting material. Thermodynamics doesn't allow this to be the case at completely stable equilibrium, so we became embroiled in an ever lengthening series of runs to get reversals. The whole thing seemed to be getting bogged-down in detail, but history was on our side. Thompson and Waldbaum published a seminal series of papers showing how mixing parameters ('W-terms') could be extracted from two-phase data, and several well-known labs in the USA became involved in crystallizing feldspar pairs and extracting Ws. Solvi proliferated, with ingenious suggestions as to why they, and hence the Ws, varied so much. We found an explanation (partial exchange equilibrium) and were able to use the crystallization behaviour to bracket the solvus at 1 kbar. Simultaneously, Bob Newton and Julian Goldsmith at Chicago, working at high pressure, hit on the same technique, although not the explanation. Some years later I got an enormous boost on first meeting Bob in Chicago; he said he had had a good laugh when a couple of unknown experimentalists from a relatively obscure Scottish University suddenly popped up with an explanation for it all. I will never subscribe to the notion that worthwhile science only gets done in big labs or that it can usefully be directed.

Shortly after arriving in Aberdeen, Henry Emeleus introduced me to Greenland and particularly the Gardar province. Summer 1966 found me and one of his research students on the uninhabited island of Nunarssuit, the west side of which is an impressive range of jagged alkali granite pinnacles, plunging into the sea at the disquietingly named Cape Desolation, discovered by John Davis in 1585. We had no boat and no radio. As a concession to safety (a topical subject in academic circles at present) we had a large piece of orange cloth, to wave at passing ships. In two months we saw one boat. I thought Greenland was fabulous, and have returned many times, spending happy weeks camping with Peter Brown, Bill Brown, Brian Upton and Neil Irvine, as well as numerous research students. I particularly enjoyed two field workshops, organized in collaboration with Henning Sørensen of the Institute for Petrology in Copenhagen. The Gardar rocks are superbly exposed and preserved despite their Proterozoic age; the variety of igneous layering in these alkaline intrusions makes the province outstanding. When it became fashionable to question the operation of gravity and crystal settling for gabbroic intrusions like Skaergaard, it seemed that breccia-filled channels like those in the Nunarssuit syenite might be the only convincing evidence for currents and settling in magma chambers. Gravity is now back in favour, and I have been to the holy-of-holies, with among others Neil Irvine and Alex McBirney. I think there are some mighty unsettling features in the layering in Skaergaard , particularly the famous trough bands, which are uncannily regular. There are many mysteries yet in the origins of igneous layering.

In 1980, Peter Brown asked me to take part in the mapping of Peary Land, which was undertaken by the Geological Survey of Greenland (GGU) between 1978 and 1980. We mapped the Kap Washington volcanics, at 83½°N, and for the brief summer were the most northerly human beings of all, a thought-provoking sensation. Peter and I had a great rapport in these remote places and I treasure the memory of that expedition more than any other. Before this big airborne enterprise the interior of Peary Land was almost unvisited and I get enormous satisfaction from seeing my name, with many others, on the beautiful maps that GGU produced after those expeditions, brilliantly led by Neils Henriksen.

My main interest in the Gardar has been the remarkable Klokken syenite. In 1971 I and a research student, Jim Anderson, were sent to map the intrusion by GGU. We were deposited on the upper slopes by helicopter, set up our camp and strolled up an alpine meadow to one of the terraces which make the layering of Klokken so conspicuous. As the 2 m-thick outcrop came into focus it became clear that it was a beautifully graded layer in which, from a feldspathic base, the proportion of dense minerals increased steadily upwards until the top was a monomineralic pyroxenite. I uttered one of those short, unpublishable sentences for which Anglo-Saxons are renowned. This apparent reversal of gravity is the norm at Klokken. It also exhibits the biggest load structures in the world, sediments included. Later, the electron and ion-microprobes (the latter work done by Roger Mason, in Cambridge) revealed that it has a cryptically layered upper border group, and a zone of side-wall cumulates through which ternary feldspars and other minerals evolve in a satisfyingly regular way.

After I had given the Hallimond Lecture in 1977 I fell into conversation with Bill Brown, who was by then based in Nancy, France. This started intense collaboration which continues to the present. The first of our many shared papers was on two-feldspar geothermometry, but we then moved on to a TEM study of feldspars from Klokken. Since moving to Edinburgh in 1988 much of my work has centred on TEM, but I am a fraud, because most of the microscopy has been done by Bill and by a succession of splendid post-docs, Richard Worden, Kim Waldron, and currently Martin Lee. Bill is a far better crystallographer than I am, but somehow our interests and approaches are complementary and I have found our collaboration hugely rewarding. TEM can open a Pandora's box in minerals with complex microtextures; the secret is to study sets of samples from simple, well understood geological settings. In this respect Klokken has been a Rosetta stone, allowing the effects of cooling rate and composition to be disentangled, and showing how fluid–feldspar reactions can lead to pervasive recrystallization within 'single crystals'. Two research students, David Walker and Adrian Finch, have explored the geochemical implications, and Alex Halliday led me to consider the importance of microtexture in the $^{40}Ar/^{39}Ar$ field. Ray Burgess, Simon Kelley and I have collaborated on a study of the systematics of argon and halogens in alkali feldspars, using laser extraction and crushing, and we can relate the gases to the enclosing microtexture. I feel sure that many of the advances of the coming years will be at the interface between microtexture and geochemistry.

Mike, we have been good friends for many years, and it is a great pleasure to receive the Schlumberger Medal from you. We have had our feet in both petrology and mineralogy, and we have branched out into new techniques, in my case TEM, in your case synchrotron X-ray work. Last summer I directed a meeting of the feldspar mafia, in the form of a NATO Advanced Study Institute, in Edinburgh, and what is striking about these meetings is not how specialized but how wide ranging they are, in Earth environments from the mantle to soils, and in techniques from the hammer to EXAFS. Although our paymasters incessantly impose the most stupid distractions upon us, the science of mineralogy will forge robustly along, and I feel greatly honoured that the Society should signify, through this medal, that I have made a worthwhile contribution.

1993 Max Hey Medal

Presentation, by the President, Professor C. M. B. Henderson, to Dr R. J. Angel, 6 January 1994, at the University of Glasgow

In 1993, the Council of the Mineralogical Society approved a recommendation to establish a new medal, specifically for a 'young' scientist; 'young' being defined as less than 35 years. It was decided to name this medal after the late Max Hey, in recognition of his contributions to mineralogy in general and to our Mineralogical Society in particular. The citation for this new medal reads 'To recognize existing and ongoing research of excellence' and 'evidence of excellence should be in the form of work published in highly-regarded, international scientific journals'. Our nominee more than meets these requirements, and it will be my pleasant duty to present the first Max Hey Medal to Dr Ross John Angel for his crystallographic research on a variety of materials.

Dr Angel has the valuable pedigree of having graduated from Cambridge University with a first degree in Mineral Sciences, followed by a Ph.D. from the same 'stable'. His research topic was concerned with structural relations and phase transformations in pyroxenes and pyroxenoids, supervised by Dr Andrew Putnis. In the course of this work he gained experience in X-ray powder diffraction, high-resolution TEM, computer modelling, and piston-cylinder experimental techniques. He was then awarded a NATO Research Fellowship to go to the USA, the first year of which was held at the State University of New York at Stony Brook where he worked with Professor Charles Prewitt. During this time he embarked on the study of phases with incommen-