

## **Presentation of the Roebling Medal of the Mineralogical Society of America for 1997 to Ian Carmichael**

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A few months ago, when Ian asked me to give the citation for his Roebling medal, I thought here was a golden opportunity to make him squirm a bit. It seems Ian is easily embarrassed if you say too many good things about him; he does far better when under attack. But on the day of the MSA awards luncheon last October, he was too clever for me and found a way to escape from my kind comments, although his solution (namely, open heart surgery) did seem a bit extreme, but that is typical Carmichael, all the way! Fortunately, however, Ian has made a superb recovery and must subject himself now to my written words as I provide some background on the man being honored this year by the Roebling Medal.

Ian Carmichael was born and raised outside of London and began his education at the age of six when he was packed off to boarding school. He continued there until his senior year of high school when he made his first trip to the U.S. as an exchange student. Instead of returning home to England for college, he enrolled himself, to the surprise and dismay of his parents, in the Colorado School of Mines and began a lifetime fascination with the rugged terrain of the western United States. At Christmastime, he returned to England for what was supposed to be a brief visit with his parents, who had not seen their son for more than 18 months, but his plans were dismantled when he was promptly drafted into the British army. This foray lasted 2 years, after which he did indeed, to the delight of his father, enroll at Cambridge University in England. Ian eventually went on to take his Ph.D. at the Imperial College of Science in the University of London. His thesis focused on a Tertiary volcano in eastern Iceland, called Thingmuli, which displays the complete tholeiitic liquid line of descent in its eruptive products. His classic papers on Thingmuli are still among his most highly cited in his otherwise impressive repertoire.

On the completion of his thesis, he was offered a job as a lecturer at Imperial College (the equivalent of an assistant professorship). During the next five years, Ian advised several Masters and Ph.D. theses and developed an expertise in the crystallization path of feldspars in silicic magmas. It was at this time, after five years on the faculty at Imperial College, that a new instrument called the electron microprobe was first being showcased at the University of Chicago. This instrument had enormous appeal to Ian, who was spending most of his time performing tedious mineral separations for wet chemical analysis. The idea that one could analyze these minerals directly in a polished hunk of rock was tantalizing, and Ian

promptly applied for sabbatical leave to visit Chicago. Electron microprobes were not terribly reliable in 1963 and after six months Ian sent in a request to his head of department at Imperial College to extend his leave an additional few months. The request was denied and he was requested to return to England immediately. Ian considered this so outrageous that he quit his faculty job on the spot. So there he was, at age 34, with a wife and three children, in Chicago, in the dead of winter, without a job. It was at this time that he was invited to Berkeley to give a talk. In February, flying out from Chicago, Berkeley must have looked like Paradise. This was in the mid-1960s and visions of David Lodge's book, "Changing Places" cannot help but pop in our heads.

Needless to say, this trip to California eventually translated into a tenured appointment as an associate professor. And the department has never been the same since . . . Seven years after arriving, Ian became chair of the department. In his first year, he came to the attention of the college administration when he overran the department's budget by a factor of two. Instead of being relieved of duties, he was promoted to a deanship in the Graduate Division in 1976, where he has worked—with a hiatus of 3 years—ever since.

This background gives us some sense of the man that a wide variety of Berkeley graduate students, including myself, would subsequently have to deal with over the ensuing 30 years. So what was Ian like to work with as a graduate advisor? Well, you can get a gist from a comment he made one Fourth of July, when he insisted that we show up for work, despite the holiday: "Just remember", he told us, "You have not yet liberated yourself from this Brit!"

When people try to describe Ian, you often see words like "enthusiastic," "charismatic," "hard-working," and "imaginative." Indeed, these are all true. However, I would like to add one that I think rivals all others: impatient! There is no one else I know who is so utterly impatient as Ian, and it is his greatest strength as an advisor to graduate students. And it is what we cursed most about him as students. And then later, we would look back with some shock at how far we had come and how much we had learned and accomplished in 4–5 short years. Nonetheless, Ian could be tough to take. I recall a field trip in which a tire on a van needed to be changed, but there was a footstep runner in the way that required a screwdriver (that we didn't have) to remove. We had a second vehicle, and the choice before us was to either

drive 40 minutes to the nearest gas station, buy the tool, and return. Or take out our hammers and bash the runner out of the way. Guess what Ian wanted to do?

I know of only one powerful antidote to this impatience and that is the tremendous pride Ian takes in making a precise and careful measurement, most particularly when he is performing a wet chemical analysis. His incessant lecture to students, repeated over and over, is that their data must stand forever. In this respect, he is patient beyond measure. The quality of Ian's wet chemical analyses for the major elements often exceeds by an order of magnitude what can be achieved with the electron microprobe, the XRF, or the ICP—which has given his students an enormous advantage. For example, one of the reasons why the measurements made in Ian's lab of heat capacity, density, sound speed, and other melt properties have been so successful is because of the quality of the compositional analyses of the experimental liquids. These analyses are labor and time intensive, which is probably the dominant reason why wet chemistry has become a lost art. Where Ian, of all people, finds the time to perform these analyses, not just on experimental liquids but also on countless samples from the field, I surely don't know.

Perhaps the answer lies in the saying: If you want something done, give it to a busy person. That certainly applies to Ian, for there are few that I know in the academic world who are so thinly spread among so many different jobs as Ian Carmichael. The guy has phenomenal energy. For the entire 20 years that Ian has been an associate dean of research, he has maintained a large and active research group—advising numerous students, many of whom have gone on to become leaders of the field in their own right. For 17 years, he was the Executive Editor of the journal *Contributions to Mineralogy and Petrology* and assured its preeminence. In the mid-1970s, Ian found the time to write a textbook on *Igneous Petrology*—which remains a classic to this day. At the time it was truly state-of-the-art, emphasizing a thermodynamic approach to the classification of igneous rocks and the prediction of crystal-melt equilibria in magmatic systems. More recently, he has become the Director of the Lawrence Hall of Science (University of California math and science outreach to K–12 children), the acting director of the Botanical Gardens at the University of California Berkeley, and yet he continues as an associate dean, and he has two active research grants from the National Science Foundation. Which is all part of the reason why he is so bloody impatient with students. He is forever reminding them: “These are your golden years!” At the time, most students have a hard time believing that their graduate student days, with a belligerent, 6 foot 3 inch, 250 lb advisor rattling their cage on a daily basis, will—on reflection—turn out to be the “golden years,” but it is true.

Perhaps it is because Ian is so busy and bogged down by administrative duties that his time spent with students—thinking about the rocks—is so treasured. For example, despite two rather bum knees (derived from too many jumps during his paratrooping days in the British army), Ian often finds the time to teach summer field camp to Berkeley undergraduates. And I should mention that Berkeley faculty are not compensated in any way, financially or otherwise, for their time spent teaching camp. Ask any undergraduate, and they will testify to Ian's infectious enthusiasm when out in the field. It seems there is always a disproportionate number of Berkeley undergraduates intent on pursuing igneous petrology in graduate school, after a summer in which Ian has taught camp.

It is also clear that for all his impatient pushing and prodding, Ian particularly values his time spent with graduate students. It begins each day with the long-standing tradition of early morning coffee. A daily 30 minute chat with Ian and his vast imagination will leave its mark on a student after 4–5 years. The other tradition is Ian's evening seminars; when I was a student, these occurred every single Tuesday: fall, winter, spring, and summer. They knew no semester bounds, had no official course number, no credit hours. The event began each and every week with a 6 p.m. Chinese dinner (the only escape from this overdose of MSG was to graduate). Afterward, we would troop back to the department for a seminar at 8 p.m. that would commonly run to midnight. If you were the speaker, there was no such thing as being “saved by the bell.” Looking back, I have never known a more demanding and critical audience when giving a lecture!

There is no doubt that Ian's greatest reputation is as a graduate advisor, who has produced an extraordinary number of successful students. And it is not just their success, but the diversity of what each of them do, that is so striking. Just about every aspect of igneous petrology is represented by Ian's students: from classic field geology and experimental petrology to magma physics and thermodynamic modeling of melts and minerals—the Ph.D. theses of Ian's students span the spectrum. So what is Ian's secret? One factor is his vision, so clearly demonstrated in his 1974 textbook. Certainly his infectious enthusiasm and charisma have played a part. But another key factor has been Ian's intellectual generosity—continually and freely handing over his ideas to his students—thrilled to see them run with it, become the one identified with it, and taking immense satisfaction in seeing his graduate students mature and succeed, one after the other.

They say that a person's importance to his field of research can best be measured by the impact of his students, and in this respect, Ian's record is truly legendary. And so, members of the Mineralogical Society of America, it is with great pleasure that I present to you Ian Carmichael as the 1997 Roebling Medalist.