American Mineralogist, Volume 84, page 1202, 1999

Presentation of the Mineralogical Society of America Award for 1998 to James M. Brenan

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Mr. President, members of the society, and guests:

James Brenan arrived in Troy, New York, in the fall of 1985, young-looking even for a 22-year-old. James was a McGill honors graduate who had quite a bit of fieldwork under his belt in the wilds of northern Canada with his early mentor, Don Francis. He came to RPI to work with me, so it became my responsibility to tame him into a laboratory geologist like myself. In fact, that was not a difficult assignment at all—James proved to have considerable natural talent in the design and execution of high *P-T* experiments, and I benefited from our interactions at least as much as he did.

In 1985 I was just beginning to think about fluid-assisted geochemical transport, and James' first "assignment" was to see if we could figure out how CO_2 moves through rocks by running some not-very-controlled decarbonation reactions at one end of a contained rock sample and monitoring fluid migration through the rock using carbon-14 beta-track autoradiography. I had never done any work quite like this myself, but I knew there would be almost nothing straightforward in either the execution of the experiments or the interpretation of results. I expected James to be back in my office in a couple of weeks to explain that I had given him an impossible assignment. James did indeed come back a short time later, but not to accuse me of cruelty—he already had the first of what turned out to be some quite interesting results. I knew that day that I had an unusual student on my hands, and I think the record of the past dozen years proves out this early prediction.

James effectively declared his intellectual independence from me following the publication of our paper on CO_2 transport, and went on to focus his doctoral research on mineral-fluid and mineral-melt partitioning of trace elements, with a view toward constraining fluid-rock interactions in subduction zones. Since that time he has published eight major papers—all as first or sole author, all in leading journals—on the theme of mineral-fluid partitioning for which he has been recognized with the MSA Award. Taken collectively, these papers provide geochemical modelers with much of the data needed to recognize the signature of slab-derived aqueous fluids and H_2O-bearing melts in convergent-margin lavas. Considering that convergent margins are important sites of bulk-Earth geochemical reorganization (through continent building and recycling into the mantle), this contribution is of considerable importance.

For those in the audience unfamiliar with experimental mineral-fluid partitioning studies, let me try to place James' work in a historical perspective. It is important to acknowledge that researchers interested in geochemical transport have known for decades that high *P-T* mineral-fluid partitioning data are of first-order importance, and numerous published results of experimental studies (mainly at relatively low *P-T* conditions) preceded James' work. The key point to recognize is that reliable data on mineral-fluid partitioning at pressures routinely achievable only in solid-media apparatus—and thus relevant to subduction-zone geochemistry—were extremely scarce, simply because the experimental challenges of obtaining such data are so great. Through extraordinary resourcefulness and skill, James succeeded in generating effectively reversed partitioning data for a wide variety of elements between aqueous fluids and several key minerals, including olivine, clinopyroxene, garnet, amphibole, and rutile. He and his co-workers also generated a comprehensive set of data for partitioning between hydrous andesitic melt and amphibole. The partition coefficients are not only "reversed" but also determined at near-natural levels and demonstrably independent of concentration over the range of interest. The set of papers describing the results constitute an experimental *tour de force* that has yielded data of immense value to the solid-earth geochemical community.

During a time of rapidly increasing sophistication in analytical geochemistry and transport modeling, paucity of basic partitioning data has remained an obstacle to real understanding of fluid-assisted processes in the Earth. Through strategic experimental studies that are both rigorous and elegant, James Brenan—even at this early stage of his career—has made vitally important contributions to our understanding of the geochemical consequences of fluid- and/or hydrous melt production and migration in subduction-zone environments. It is fitting that the MSA award Committee has chosen to honor him today with the 1998 Mineralogical Society of America Award.

0003-004X/99/0708–1202$05.00