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Meteorites, Ice, and Antarctica. William A. Cassidy. A personal account. Cambridge University Press, 2003, 349 p., US $25 (ISBN 0-521-25872-3).

Bill Cassidy had a good idea and he pursued it. In 1973 he heard a talk at a scientific meeting about meteorites that a team of Japanese glaciologists had found in Antarctica in 1969. He knew that meteorites were rare, yet the glaciologists had found nine meteorites of five different types on a small (5-km × 10-km) patch of blue ice. Cassidy left the talk with the realization that "meteorites are concentrated on the ice in Antarctica!" and that "there *must* be some kind of concentration mechanism." Although he admits that others had the same epiphany, Cassidy was the one who turned a concept into the highly successful ANSMET (Antarctic Search for Meteorites) program.

The U.S. ANSMET program for collecting meteorites in Antarctica, which Cassidy began in 1976, as well as parallel programs that subsequently developed in Japan and Europe, are second only to NASA's Apollo program (which ended in 1972) in impact and benefit to sample-based planetary science. Of the 76 regular articles involving research in cosmochemistry published in this journal in 2003, 51% relied in an obvious way on data obtained from meteorites collected by the ANSMET program. The first meteorite recognized to be a piece of the Moon (ALHA 81005) was collected by ANSMET in 1982; subsequently 15 other lunar meteorites have been recognized among those collected in Antarctica. Of the 29 martian meteorites known at this time, 10 have been found in Antarctica, including the only orthopyroxenite and 5 of the 6 peridotites. The number of meteorites available for scientific study today is 2 to 10 times greater (depending upon how one counts meteorites) than it was in 1969 when the first meteorite concentration was found in Antarctica. One key to the success of ANSMET is that, from the beginning, Cassidy staffed his field parties with enthusiastic planetary scientists from the international community, most of whom (like this reviewer) were "beakers" (lab scientists, in McMurdo-speak), not trained outdoors professionals. (To be fair, another essential key to ANSMET success was Cassidy's choice of trained outdoors professionals to keep the amateurs out of trouble.)

Cassidy's new book is a record of ANSMET history. The chronicle is annotated with Cassidy's retrospective views of the program's successes and failures. The five chapters of Part I of the book describe the history of the ANSMET program, the uphill struggle to get the crazy idea funded, and what it is like to live and work in an isolated field camp in Antarctica. This section is the most readable and will be of particular interest to ANSMET alumni, wannabes, and followers. In Part II, the first two chapters describe the most far-reaching achievements of the program, the finding of meteorites from the Moon and Mars. Cassidy carefully outlines how these rare finds, and the information derived from them, have influenced planetary science. The section ends with a chapter discussing asteroidal meteorites and their importance to our understanding of early solar system history. The interpretations of Part II are aimed at the inquisitive layman, thus experts may quibble with details but the importance of the meteorites is not overstated. This reviewer's most significant but still minor quibble is with Table 7.1. The table implies that the 10 lunar meteorites that have been found in Antarctica for which there are cosmic-ray exposure data derive from only 6 different craters and that 9 of the 10 meteorites are "site paired" with another lunar meteorite. The footnote explains that the assignments are actually could-have-been scenarios on the basis only of overlapping ranges (uncertainties) in the time of ejection from the Moon from cosmic-ray exposure data. However, when compositional, mineralogical, and textural data are also taken into consideration, the hard-to-quantify likelihood that certain pairs of meteorites were blasted off the Moon by a single impact decreases considerably. Almost certainly, for example, QUE 94281, a regolith breccia containing highland material and mare basalt, was launched by a different impact that that which launched NWA 032, a crystalline mare basalt with very different composition and mineralogy than the basalt component of QUE 94281.

Part III begins with a long chapter addressing an issue that begs addressing. Given that the average terrestrial age of Antarctic meteorites (all of which are well preserved finds) is considerably greater than that of meteorites in the historical collection (recent falls and finds), is there any hint that the distribution of meteorite types is different? This chapter involves some statistical arguments and is, as a consequence, the least readable. The next chapter addresses the details of how flowing ice concentrates meteorites and how meteorites might be used as tracers to understand the dynamics of Antarctic glaciers. The final chapter discusses the future of meteorite collection in Antarctica. Cassidy has given considerable thought to issues discussed in Part III.

The book is subtitled "A personal account," and indeed it is. Those of us who have been huddled in a tent with Bill while the wind howled outside will recognize his stories and his humorous story-telling manner. I truly wish that I had written the paragraph (p. 104–105) involving the meteorite Nakhla, the Egyptian dog, and cosmic misfortune. Numerous photographs, charts, and tables, which are well reproduced, add to the book's interest and usefulness. Cassidy's experience as a teacher of undergraduates shows throughout the text and I anticipate that parts of the book will provide the meat for term papers by the students of readers of this journal. The book is ideal reading for a cold winter night and should be an inspiration to anyone who has had a good idea only to have it ignored and castigated by short-sighted reviewers.

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