

## CURATORIAL FUNCTIONS AND THE U. S. ANTARCTIC METEORITE PROGRAM

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**Abstract:** The discovery of concentrations of meteorites in Antarctica by Japanese field parties in 1969, and subsequently by joint U.S.-Japanese and U.S. field parties since 1976 has provided a significant new resource for understanding the origin and evolution of the solar system. The number of meteorites as well as the variety of meteorites has increased dramatically, and substantial amounts of data derived from their study has begun to appear in the scientific literature. The U.S. program of investigation has drawn on curatorial experience derived from the lunar program to: (1) develop specific collection and preliminary examination protocols (ANNEXSTAD and CASSIDY, Mem. Natl Inst. Polar Res., Spec. Issue, 17, 14, 1980); (2) provide documented samples for scientific investigations in response to specific requests; and (3) coordinate research by scientific consortia. The productivity of scientific research is significantly enhanced by these management approaches. This paper describes some of the results of the curatorial program for Antarctic meteorites carried out over the past three years.

### 1. Preliminary Description

The preliminary examination of meteorites depends on a combination of macroscopic and microscopic examinations. The principal means of classification is carried out using optical microscopy and electron microprobe analysis. For chondrites, the classification of VAN SCHMUS and WOOD (1967) is followed. Most meteorite classification of the U.S. collection has been carried out by B. MASON of the U.S. National Museum of Natural History. This information is compiled in the Antarctic Meteorite Newsletter, which is distributed to approximately 500 scientists. The Newsletter is published whenever descriptive information has been compiled on a suitable portion of the collection, or when other information of interest to investigators has been compiled.

The purpose of the preliminary description is to provide enough information to allow meteoriticists to determine which meteorites they wish to study. The descriptions are only carried to the classification stage; if scientists wish to publish further detailed descriptions, they must request samples for study. Libraries of polished thin sections of many meteorites are available at both JSC and the U.S. National Museum

for non-destructive, optical examination. (For meteorites of the joint U.S.-Japan expeditions, a set of thin sections also is available at the National Institute of Polar Research, in Tokyo).

The U.S. collection contains a large number of small fragments that weigh less than 100 grams. In order to increase the rate at which meteorites could be classified, a procedure was defined by which samples from a number of specimens, weighing less than 150 grams each, were provided to each of several meteoriticists for preliminary description. Scientists who agreed to provide descriptions for inclusion in the Antarctic Meteorite Newsletter include C. B. MOORE, Arizona State University, K. KEIL, University of New Mexico, H. J. FITZGERALD, University of Adelaide, Australia, M. RHODES, University of Massachusetts, and S. J. B. REED, Cambridge, England. In return for these descriptions, these investigators have the right to prepare and publish descriptive papers before the samples are made generally available to the meteoritical community, thus giving them limited exclusive access to those samples. Early results suggest that a number of interesting and potentially unique meteorites are included in the smaller specimens and that this approach satisfies both curatorial and scientific concerns. The entire 1976–1979 sample collections (689 specimens) have been described and reported in the Antarctic Meteorite Newsletter.

## **2. Provision of Samples to Investigators**

Specimens have been made available to qualified meteoriticists on the basis of letter sample requests. The request is first reviewed by the Curator plus two members of the Meteorite Working Group. Samples may be provided by the Curator with no further review if a small proportion of a meteorite is requested and the meteorite is not especially complex or in low abundance. If the request is more complicated, it is referred to the full Meteorite Working Group at their semi-annual meetings. Requests are evaluated from several aspects, including: (1) Are they specific with respect to the meteorite and amount of material requested; (2) Are they relevant to the study of Antarctic meteorites; (3) Do they address the scientific questions adequately; (4) Do they require or are they best done with Antarctic meteorites; and (5) Can the request be fulfilled without unreasonably diminishing the collection.

Most requests that have been reviewed by the Working Group eventually have been approved. However, through the overview provided by the Working Group, modifications of sample requests have been made, for example, by finding samples better suited for the experiment than the ones requested, or by clarifying the experimental plan of the investigator to reduce the amount of material used in the study. Samples allocated for study are prepared under controlled environment conditions to reduce the possibility of contamination (ANNEXSTAD and CASSIDY, 1980).

In three years of Antarctic meteorite curation, over 1200 meteorite specimens have been provided to more than 100 scientific groups in the United States and 12

other nations. This does not include meteorite specimens provided to the Japanese collection by agreement between the U.S. and Japan, or samples provided for preliminary examination to B. MASON.

### **3. Inventory Control**

By agreement with the National Science Foundation, a complete record is maintained of the location and distribution of Antarctic meteorite specimens. The inventory procedure is based on one used for the lunar sample collection, providing a computer indexing by sample number, weight and location. Over 3700 subsamples are now being tracked in this system. Although investigators presently are not required to return sample materials provided for study, they are asked to document sample use and to provide an inventory of materials in their possession once every two years. The inventory system can be used to optimize sample distribution, by keeping track of samples that are available for transfer from one investigator to another, thus reducing the sample preparation load on the Curator.

### **4. Coordination of Investigations and Sample Documentation**

Samples of special interest may be provided to groups of investigators (consortia) organized usually by individual investigators who agree to lead the investigation, coordinate sample requirements, describe subsamples and insure the publication of results. The Curator may contribute to the study in various stages: (1) identification of samples suitable for consortium studies; (2) identification of investigators who may provide key studies of interest to the consortium; (3) preparation of samples selected by consortium leaders or members and (4) documentation of samples provided to the investigators. The study of EETA79001 is typical of such a study. The consortium was initiated by H. MCSWEEN, who assembled the investigator team consisting of 10 investigator groups. A. REID, working in the curatorial facility as part of the consortium team, selected individual subsamples which were prepared and sent to consortium members. The Meteorite Working Group and the Curator identified additional members to be included in the consortium. The Curator provided detailed documentation of subsamples that allows the relationship of the various subsamples to one another and to the original meteorite to be understood.

### **5. Management of the Collection**

At this time, a relatively open policy of providing samples to investigators is being followed and the result is that a substantial number of scientific papers are being published. Except for a few small or rare meteorites, most investigator requests have been filled and for most samples only a small amount of material has been allocated

relative to the original specimen. The sample preparation procedures are simple and followed routinely so that investigators have confidence that the materials are those needed for their investigations and can be traced in curatorial records. The centralized source of samples and data has significantly increased the availability of samples for study and cooperative studies of the samples.

Although the initial stages involved several laboratory personnel in the curatorial facility, operations have become routine and most description and sample preparation work is carried out by a staff of three persons under the supervision of the Meteorite Associate Curator. The result is efficient service to the meteoritic community as well as conservation and preservation of an important extraterrestrial sample collection.

#### References

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