

### MICROBIAL CONTAMINATION STUDY OF ANTARCTIC METEORITES: AS-FOUND, POST-CURATION, AND LONG-TERM STORAGE

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**Introduction:** We present the results of a comprehensive microbiological contamination study performed on Antarctic meteorites. The scope of this study covers meteorites analyzed in their as-found condition via field study (with appropriate permissions obtained), analysis of the same meteorites after curation through the standard ANSMET collection and JSC sample handling protocols, and analysis of a suite of meteorites obtained from long-term storage at the Smithsonian Institution. The purpose of this study is to identify the type and degree of microbial contamination in Antarctic meteorites commonly used for scientific study so as to provide a description of the background level of microbial contamination in these samples. These results are applicable to a broad range of studies to include the organic composition of carbonaceous chondrites as well as astrobiological studies of martian meteorites.

**Methods:** Three sample suites were analyzed using a common set of analytical methods.

*Analytical Methods:* Microbial abundance was measured via limulus amoebocyte limulus (LAL) assay using a field-portable instrument. This method provides single-cell sensitivity for detection of gram-negative microbes. Microbial metabolic activity was measured using adenosine triphosphate (ATP) luminometry, also using a field-portable instrument. Polymerase chain reaction (PCR) genetic diversity analysis was performed in a laboratory setting. Degenerate primers were used for eukaryote, archaeobacteria and eubacteria and a range of functional genes for carbon, sulfur and nitrogen cycling were used if a positive reaction was observed. All measurements include an appropriate suite of standards and witness plate test samples. This suite of measurements describes how many microbes are present, how metabolically active they are, and what chemical methods they are using to sustain their metabolism.

*Sample Suites: (As-Found)* Six ordinary chondrites were analyzed in the field during the 2007-8 ANSMET season using a portable, sterile glove box. Three samples were collected using special aseptic methods and three were collected using the standard ANSMET protocols. An additional three non-OC meteorites that were found serendipitously, collected aseptically were examined as well. *(Post-Curation)* The same meteorites were requested through typical channels and the same set of analyses performed to compare with their as-found condition. *(Long Term Storage)* Three meteorites were requested from the Smithsonian Institution's long term storage facility. The meteorites were originally collected from Antarctica in 1977. Analysis of this sample suite is designed to examine the effects of microbial colonization during long-term storage.

All samples analyzed are ordinary chondrites as these are the only type that sampling permission was obtainable for the field study, and is the only type that we could reliably expect to sample in the field.

**Reference:** Fries M. et al, Abstract #5201, Meteoritical Society Conference 2005.