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The meteorites of Mars: Sample return this millenium

As this issue of *Meteoritics & Planetary Science* crystallized before my eyes, more precisely the Managing Editor's eyes, we observed a paradox—that while martian meteorites constitute 0.05% of the known meteorites, they constitute 50% of the articles in this issue. Meteorite researchers are used to seeing such selection effects, and these certainly are exciting rocks. In fact, NASA will spend 250 million dollars to bring back gram-sized samples of the martian surface to Earth in the first decade of the next millenium. However, thirteen pieces of Mars are already in our laboratories and releasing their secrets, one by one.

Shearer *et al.* point out that elemental and isotopic composition and the textures of olivine in ALH 84001 suggest formation >800 °C, and that the exsolution on cooling might have produced magnetites that others have attributed to biogenic activity. Mittlefehldt *et al.* use geochemical arguments to show that the so-called lithology A in EETA79001 is an impact melt, which means that its age does not reflect igneous activity on Mars and its composition cannot be used for experimental modelling. Bridges and Grady describe assemblages of halite–siderite–chlorapatite that they suggest are evaporites that entered the igneous martian meteorite Nakhla at either low or high temperatures. Schade and Wasch describe small beam near-infrared reflectance spectroscopy of Nakhla and Zagami and find that the spectra are capable of identifying individual minerals. These spectra also help decipher similar spectra for the martian surface. Norman uses the rare earth element composition and Nd isotopic ratios for martian meteorites to estimate the thickness and composition of the martian crust. Finally, Bogard and Garrison measure the Ar-Ar ages for eight martian meteorites and infer the composition of the martian atmosphere from their data.

These papers are highly diverse and beautifully represent the variety of processes occurring on Mars, and the variety of techniques by which they can be studied. They also nicely underscore the way in which Mars sample return was handled in this millenium.

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Editor
