



Award

2002 Leonard Medal Citation for Donald D. Bogard

Some sage once noted that the universe is full of magical things patiently waiting for our wits to grow sharper. Don Bogard's wits have been up to the universe's challenge, and it is my privilege to recount the magical things he has discovered.

Don's wits were honed and his accent was refined at the University of Arkansas, where he received three degrees in chemistry, radiochemistry, and isotope geochemistry. After a postdoctoral appointment at Caltech, he became a staff scientist at NASA's Johnson Space Center, where he has spent his professional career.

Judging from the more than 40 papers he has published on the subject, Don's chief interest lies in determining the chronologies and thermal histories of meteorite parent bodies. By my count, he has measured the ^{40}Ar - ^{39}Ar ages of at least a hundred meteorites, which include samples from virtually all meteorite classes. Working with numerous collaborators, he has deciphered the overlapping igneous, metamorphic, and collisional events that these meteorites experienced. This research has documented that the heavy bombardment at about 4 Ga ago scarred not only the face of the moon, but affected the whole inner solar system.

Don has made substantial contributions to our understanding of noble gas nuclides produced by cosmic-ray exposure of meteorites in space, especially variations in nuclide production rates resulting from differences in chemical composition and shielding. In 18 papers with long-time colleague Larry Nyquist and other collaborators, he has also catalogued the cosmogenic and trapped solar noble gases in Apollo soils and breccias, thereby elucidating the irradiation and mixing history of the lunar regolith.

At the Meteoritical Society's meeting two decades ago, Don astounded a packed session by showing that a shergottite contained shock-implanted gas having the same composition as the martian atmosphere. This discovery was to become the prime evidence that SNC meteorites are martian rocks. Since then, he has published a dozen papers dealing with cosmogenic and trapped martian atmospheric gases in SNC meteorites. He has used the noble gas composition of the trapped atmospheric component to constrain outgassing of the martian interior and evolution of the atmosphere through the loss of light isotopes.

If that were not enough, Don has published papers on the composition of the solar wind and characteristics of energetic solar protons, the behavior of noble gases during shock implantation, the isotopic composition of fission and



Fig. 1. Donald D. Bogard. Judy Allton took this picture in Houston, Texas during the summer of 2003.

cosmogenic xenon and krypton, classical K-Ar dating of iron meteorites, and neutron capture effects in meteorites. And he has done all this while remaining one of the nicest, most unassuming, and most approachable people in the business.

I'd like to end this citation with an instructive story about Don and martian meteorites: In the 1960s, Don and fellow graduate student Marvin Rowe analyzed the isotopic composition of xenon in achondrites to search for decay products of extinct ^{244}Pu . To extract the plutonium fission component from the measured xenon spectrum, they needed to correct for xenon produced by spallation. They noted that nakhlites apparently contained no fission xenon, so nakhlite isotopes were used to correct other achondrites for the spallation component. At the time, Don wondered why among the achondrites only the nakhlites contained no fission xenon. The answer, of course, is that these meteorites were too young to contain an extinct radionuclide, but he did not yet know that. Later, in the 1970s, Don and L. Hussian determined the ^{40}Ar - ^{39}Ar age of the Gobernador Valadares nakhlite, and he and Larry Nyquist dated shocked shergottites to determine their impact ages. Despite the young ages they

measured, their perception was still that these chronologies were determined by impacts on an asteroid. Even in 1982, when Don and Pratt Johnson attempted to determine the age of shock glass in EETA79001, it was with the goal of dating an asteroidal impact. Not until he characterized the perplexing trapped noble gases did he seriously entertain the idea that this meteorite might be martian. The moral of this story is that opportunity sometimes knocks more than once. I suppose you might say that wits get sharper when one is hit on the head repeatedly.

Don's many contributions to our understanding of the chronologies and thermal histories of the moon and meteorite parent asteroids, of the interactions of cosmic particles with meteorites and planetary surfaces, and of the composition and

origin of volatile components in the solar system qualify him for this Society's highest honor. Mr. President, I am honored to present Donald Bogard, recipient of the 2002 Leonard Medal.

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Donald Bogard received the Leonard Medal on July 20, 2002 at the 65th Annual Meeting of the Meteoritical Society in Los Angeles, California, USA.
