

2002 MEDALS AND AWARDS

YOUNG SCIENTIST AWARD (DONATH MEDAL)

Presented to Ariel D. Anbar



Ariel D. Anbar

Citation by Heinrich D. Holland

It is always a pleasure to present a former student for an award. The pleasure is particularly keen when the honored student has become a personal friend and a valued colleague.

While Ariel Anbar was an undergraduate at Harvard in the late eighties, I was struggling to determine whether solar ultraviolet light played a role in the origin of banded iron formations. At that time, the response of manganese to ultraviolet light promised to be a useful clue to the puzzle. Unfortunately, Ariel's senior thesis demonstrated very clearly that it did not.

After this demonstration, Ariel moved to Caltech for graduate work. There Gerry Wasserburg taught him how to make very difficult measurements very precisely. This led to his doctoral dissertation and to the first determinations of the concentration of iridium in natural waters.

Since 1996, Ariel has been on the faculty of the University of Rochester, first as an assistant professor and now as an associate professor. The years at Rochester have been very fruitful. Ariel's Caltech expertise blossomed first into the use of iridium anomalies in sediments to define the habitability of the early Earth. Subsequently, he has been among the pioneers in using new mass spectrometric methods to explore the stable isotope geochemistry of transition metals, particularly iron and molybdenum. His iron isotope research demonstrated the importance of inorganic chemistry for this isotope system. His exciting, ongoing study of the isotopes of molybdenum in carbonaceous shales promises to resolve long-standing questions regarding the oxidation state of the oceans during the Proterozoic Era. He has supervised an impressive number of undergraduates and graduate students, has taught a wide range of courses, and has acquired a burgeoning family. We at Harvard are fortunate to have him as a member of the NASA Astrobiology Institute team, which has its center of gravity in Cambridge.

Ariel Anbar is clearly a bright young star in the geological firmament. It is a privilege Mr. President, to present to you this outstanding scholar, teacher, and mensch for the Society's Donath 2002 Medal.

Response by Ariel D. Anbar

It is especially meaningful to me that this award comes from the Geological Society of America, and that Prof. Holland gave the citation. I became a geoscientist because I was fascinated by the history of the Earth and of life, and their "coevolution". Such topics have a home in the GSA. And Dick Holland and Gerry Wasserburg, the most influential mentors in my academic life, profoundly affected their study.

Historical research requires that we struggle with a sparse geologic record, particularly in the Precambrian. This means developing new analytical tools to get old rocks to tell new stories. My early career has been devoted to this effort, most recently focusing on the stable isotope geochemistry of transition metals. I am fortunate that Francis Albarède and Alex Halliday pioneered the technologies that opened this door just as I arrived on the scene. As revealed by my group and by others, Fe, Mo, Cu, Zn, Cr, Cd and even Tl isotopes commonly fractionate in nature. With Ken Nealson, Sue Brantley and Mukul Sharma, we have studied mechanisms of Fe isotope fractionation in hopes of revealing new biosignatures. This is a difficult but worthy challenge. With Andy Knoll and Tim Lyons, we are using Mo isotopes to study changes in ocean redox, notably in the Proterozoic. Initial results are very promising. It is an exciting time to be a geochemist!

I am fortunate to have a supportive setting at the University of Rochester, which gambled on a brash young scientist with a dissertation still warm from the copying machine. Asish Basu and John Tarduno secured resources, gave wise counsel, encouraged my odd isotopic and geobiological interests, and reinforced my aspirations through their exceptional research. They enliven my professional life, as do Udo Fehn, Bob Poreda and the rest of the faculty. After living in Cambridge and Pasadena, it is a privilege to have colleagues who demonstrate every day that high-impact science is possible even in a city that does not have a high cost of living.

In the lab, I am indebted to Jane Barling for keeping standards high. Jo Roe, Gail Arnold, Karen Knab, Matt Polizzotto and Erick Ramon gracefully endured my experiments in mentoring while doing the really hard work. They made this award possible.

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I am also grateful to a long list of mentors and colleagues from whom I draw inspiration. I cannot give proper thanks in the time allotted, but will do what I can.

I owe an incalculable debt to my first mentors, my parents, Michael and Ada, and my brother, Ran, who encouraged me by their examples to follow my interests. When they learned I was going to pursue a career in geoscience rather than medicine, they never asked, "but how are you going to make a living?" It is true that you can't choose your family, but I would choose them if I could.

At Harvard, Prof. Holland rescued a discontented chemistry major by teaching me to combine chemistry with "back of the envelope" calculations to learn about the Earth. Suddenly, chemistry seemed relevant, and geoscience the most exciting application. I promptly changed my major!

Prof. Holland steered me to Caltech, where I was drawn into Gerry Wasserburg's orbit. I arrived just as the "Lunatic Asylum" revolutionized geochemistry for the umpteenth time, leading to my work on Re and Ir in seawater. From Dr. Wasserburg with the help of Dimitri Papanastassiou and Rob Creaser, I learned to practice science with honesty, rigor, and attention to detail, but without getting lost in trivia. I also learned to pursue novelty without flights of fantasy. If I have avoided both trivia and fantasy and if I continue to do so in the future, it is because Dr. Wasserburg taught me to strike the right balance.

Others also helped make Caltech a magical experience. From Sam Epstein and Yuk Yung, I learned about the power of informed intuition. From George Rossman, the value of exploration without clear destination. From Lee Silver, the elusive goal of integrating field and lab. During his Pasadena visits, I was inspired by Karl

Turekian's enthusiastic creativity. Many other faculty, fellow students, postdocs and staff helped me learn the ropes, made the good times better, and the hard times easier. Mark Allen, Per Andersson, Rosemary Capo, Yigal Erel, Laurie Leshin, John Holt, Hari Nair, Don Porcelli, Brian Stewart, Kim Tryka and Laura Wasylenki head a list too long to complete.

In more recent years, as part of the Harvard/MIT astrobiology group, I regularly visit Cambridge. There, I am inspired by the abilities of Sam Bowring, Ed Boyle, John Hayes, Stein Jacobsen, and Roger Summons to turn analytical expertise into geoscience knowledge, and Paul Hoffman's ability to see the big picture. From opposite ends of the country, Andy Knoll and Ken Nealson patiently tutor me in biology, and humanity. From the other side of the planet, Roger Buick emphasized the value of fieldwork, and of "colorful" language. Greg Ravizza, generous to a fault, is the unsung hero of Mo isotopes and much else. Tom Bullen, Rosalind Grymes, Munir Humayun, Steve Mojzsis, Mark Rehkamper, Kevin Zahnle and many others have helped make most days fun and productive. I hope for many more such days, with many more such people.

Clair Patterson once told me that while money may be the source of all evil, it is surely the source of all science. And so I thank the NSF and the NASA Astrobiology Institute for supporting my efforts.

Above all, I thank my wife, Marni, for nearly twenty years of loving friendship that words cannot describe, and my son, Nathaniel, who constantly reminds me that science is not really a career, but an attitude of constant curiosity.

Again, thank you for this honor.