



21st Annual W.S. Jardetzky Lecture

Past Lecturers

Roger G. Bilham, 2015
University of Colorado, Boulder

Jerry X. Mitrovica, 2014
Canadian Institute for Advanced Research

John P. Grotzinger, 2013
California Institute of Technology

Ellen Mosley-Thompson, 2012
The Ohio State University

Stephen R. Rintoul, 2010
CSIRO Marine and Atmospheric Research

Sallie W. Chisholm, 2009
Massachusetts Institute of Technology

Donald W. Forsyth, 2008
Brown University

Inez Fung, 2007
University of California, Berkeley

Barbara Romanowicz, 2006
University of California, Berkeley

Nicolas Gruber, 2005
Swiss Federal Institute of Technology, Zurich

Alan R. Levander, 2003
Rice University

David M. Karl, 2002
SOEST, University of Hawaii

Veerabhadran Ramanathan, 2000
*Scripps Institution of Oceanography
University of California, San Diego*

John R. Delaney, 1999
University of Washington

Peter H. Raven, 1998
Missouri Botanical Garden

Sir Nicholas Shackleton (1937-2006), 1996
University of Cambridge

Dan McKenzie, 1995
University of Cambridge

Sean C. Solomon, 1994
Carnegie Institution for Science

Edward A. Irving, 1993
Geological Survey of Canada

Frank Press, 1992
U.S. National Academy of Sciences

Peter Molnar

Professor of Geological Sciences
University of Colorado, Boulder

“Laurentide Ice Sheets, the Emergence of the Isthmus of Panamá, and the Great American Biotic Interchange: A Red Herring Inserted Between Climatic Cause and Biological Effect”

Two events seemed to have occurred virtually simultaneously at ~2.5 million years ago (Ma): the first big ice sheet, since 300 Ma, covered Canada, and the Great American Biotic Interchange began with the crossing of largely large mammals through the Isthmus of Panamá, from North to South America and vice versa. An emergent isthmus seems required for such animals to change hemispheres. A popular myth, pervading textbooks and Wikipedia, holds that the isthmus emerged near ~2.5 Ma or perhaps slightly earlier, and that by doing so, it altered Atlantic Circulation sufficiently to enable ice sheets grow on Canada. I contend that the Great American Biotic Interchange, which seems to consist of four (or more) separate events, occurred when large Laurentide ice sheets pushed the ITCZ southward so as to cool and aridify eastern Panamá. Most of the animals involved in the Great American Biotic Interchange seem to have been savannah-dwellers; not only do they refrain from passing through eastern Panamá today, but (I presume that) they also would have avoided its swamps, jungles, snakes, crocodiles, mosquitoes, and other nasty predators before savannah-like environments drew them in and facilitated safe passage. Although at times shallow connections between the Caribbean and the Pacific may have confined terrestrial fauna to one of the Americas, recent geologic evidence shows that the principal gateway, the “Bolívar Trough” in eastern Panamá, had emerged by ~15 Ma. Moreover, for the passage of Pacific waters to have affected Atlantic Ocean circulation before ~2.5 Ma, ancestors of salamanders, frogs, snakes, fish, etc., who currently confine themselves to fresh water but passed through Panamá before ~5-20 Ma, must have been extraordinary swimmers to beat the required Pacific to Caribbean current. Although herrings do swim, red ones, like a recent emergence of the Isthmus of Panamá, live longest out of water, before rotting away in full view.

Friday, 6 May 2016

3:30 p.m.

Monell Auditorium

Reception to follow

The Jardetzky lecture in geophysics honors the late Wenceslas S. Jardetzky, a renowned researcher and educator whose flourishing scientific career in Europe was halted by World War II and revived after he emigrated to the United States. From 1949 until his death in 1962, he was a research associate at Lamont-Doherty.

The Jardetzky lecture was established in 1992 by Dr. Jardetzky's son Oleg, who is the founder of the Magnetic Resonance Laboratory and professor of molecular pharmacology at Stanford University. In endowing the lectureship, Dr. Jardetzky said he hoped it would “help enrich the outstanding tradition of the Lamont-Doherty Earth Observatory, which provided a much cherished intellectual home to my father after he emigrated to this country.”