

2012 MEDALS & AWARDS

ISRAEL C. RUSSELL AWARD

Presented to
Tim K. Lowenstein



Tim K. Lowenstein
SUNY at Binghamton

Citation By Kathleen C. Benison

It is a great honor and privilege for me to present the citation for the Israel Cook Russell Award for major contributions to the field of limnogeology to my teacher, friend, and colleague, Dr. Tim Lowenstein.

Tim is the international leader in the fields of chemical sedimentology and brine geochemistry, and for decades has developed and applied new concepts and techniques to chemical sediments to solve significant geological problems. It is fitting that Tim has earned an award commemorating Israel Russell because both are known for their studies of saline lakes in California.

Tim's research program has been driven by significant questions about the Earth that he answers with innovative approaches using brines and evaporites. His work has resulted in enhanced understanding of lithosphere-hydrosphere-atmosphere-biosphere interactions. Tim was among the first to apply comparative sedimentology to evaporites. He has pioneered the study of fluid inclusions in halite to interpret past environmental conditions. He has produced paleoclimate records from salt cores in California, the Andes, and China. He has quantified atmospheric CO₂ from the Eocene Green River Formation. Tim has addressed the controversial Messinian Salinity Crisis of the Mediterranean. He has traced seawater composition through geologic time. He has isolated, cultured, and identified

microorganisms in brines and fluid inclusions in halite. Besides field sites on six continents, Tim has studied chemical sediments on Mars. At an age that technically makes Tim a mid-career scientist, he has published 3 papers in *Science*, 1 paper in *Nature*, and 8 papers in *Geology*. These significant publications are testimonials to the importance of his research to the wider scientific community. I eagerly look forward to Tim's future contributions to the field of geology.

Tim has a sustained record of serving the scientific community. He has been associate editor of *Journal of Sedimentary Research*, *Geochemical et Cosmochimica Acta*, and *Geology*. He has been a willing and thorough manuscript and proposal reviewer. Tim's distinguished lectureship for the Mineralogical Society of America and participation on NASA steering groups are examples of how he contributes his limnogeological expertise to the wider scientific community.

This citation would be lacking without mention of the profound positive influence that Tim has had on his students and collaborators. Tim's outstanding teaching and mentoring have enabled his students to become leaders in academia, industry, and government. I consider myself very fortunate to be among the 11 Masters students, 9 PhD students, 3 post-docs, and 2 early-career visiting scholars to date who have worked with, and been inspired by Tim. Tim has had long-term and highly productive working relationships with many collaborators as well. I am certain that all of these students and collaborators value his great friendship as much as his scientific expertise.

It is with great joy that I ask that you join me in congratulating the Limnogeology Division's 2012 Israel Cook Russell awardee, Dr. Tim Lowenstein.

Response by Tim K. Lowenstein

My sincere thanks to the Limnogeology Division of the GSA for the Israel C. Russell Award and to Kathy Benison for her citation. It is a great honor to receive this award. I did not grow up on the shores of a lake, not even close. I became interested in lakes as a graduate student at Johns Hopkins where Lawrie Hardie used simple ideas like chemical divides to explain how natural waters in closed basins evolved into brines. At that time, a field trip to the closed basins of California and Nevada opened my eyes, particularly seeing that the zonation of saline minerals and brines in Saline Valley could be explained by chemical principles. Back then, surprisingly, chemical theories were

ahead of our knowledge about what evaporites actually looked like, and their potential as paleoenvironmental and paleoclimatic indicators was largely untapped.

The 1990s saw development of techniques for chemical analysis of fluid inclusions, pioneered by geochemists at the University of Barcelona and at Binghamton by Mike Timofeeff. Now we could chemically analyze fossil waters in fluid inclusions and document secular variations in the chemistry of ancient seawater, first considered by Lawrie Hardie and Ron Spencer, and then elegantly modeled by Bob Demicco, using variable river and midocean ridge inflows, not unlike the mixed inflows found in closed basin lakes. The ocean is a large saline lake!

Fluid inclusions in saline minerals are also hosts for microbial life. The discovery of ancient microbial ecosystems trapped inside fluid inclusions in buried halite from Death Valley, along with DNA and living organisms, has been an astonishing surprise. These connections inspired collaborations with microbiologist Russell Vreeland, ecologist Matt Parker, and DNA specialist Koji Lum.

I have many people to thank for teaching me about lakes, modern and ancient, including Joe Smoot, Lawrie Hardie, Alan Carroll, Bob Demicco, Blair Jones, Hans Eugster, Larry Benson, Ron Spencer, Terry Jordan, Linda Godfrey, Paul Baker, Sheri Fritz, Rick Forester, Richard Ku, Shangde Luo, Robin Renaut, Bernie Owen, and Kathy Benison. I am grateful to Colgate professors Bruce Selleck, Rich April, and Jim McLelland for steering me into geology. I want to acknowledge the wonderful graduate students and postdocs I have had: Jianren Li, Chris Brown, Laura Howe, Andy Bobst, Matt Hein and Jonathan Kramer documented closed basin climate records; Enrique Casas, Kathy Schubel, and Lichun Ma studied modern evaporites and brine evolution; Dan Davis and Osama Attia worked on fluid inclusions; Mike Timofeeff, Sean Brennan, Cindy Satterfield, Nora Holt, and Natalie Spear documented ancient seawater chemistry; Brian Schubert, Kat Gragg, Yaicha Winters, Krithi Sankaranarayanan, and Sarah Feiner studied microorganism communities in evaporites; Elliot Jagniecki, John Murphy, and Deidre LaClair work on the Green River Formation; and Kathy Benison and Denise Waite studied burial diagenesis of carbonates.

This is where I will end, with enormous gratitude to Binghamton University and colleagues there, and my wife Sally, for providing the freedom and time to pursue my dreams, and to past and current students and collaborators who find joy in studying lakes.