R. Lawrence (Larry) Edwards

Larry Edwards is a geochemist with interests in climate history, climate change, and geochronology. He is the George and Orpha Gibson Chair of Earth Systems Science and Distinguished McKnight University Professor at the University of Minnesota.

Edwards was born in Boston, Massachusetts. His father, Richard Edwards, is from a distinguished American family descended from the Reverend Jonathan Edwards and his mother, the late Vee Tsung Ling Edwards, was from China. Edwards grew up, along with three sisters in Ann Arbor, Michigan.

He earned S.B. degrees in both Earth and Planetary Sciences and in Art and Architecture from the Massachusetts Institute of Technology in 1976. In the late 70's, while working as a naturalist for the National Park Service, he spent many weekends in the wilderness outside of the small town of Bigfork, Minnesota learning the ancient art of birch bark canoe building from the master builder, the late Bill Hafeman. Edwards earned his master's degree in Geological Sciences from the University of Michigan in 1986, mentored by the late E.J. Essene and his Ph.D. in Geochemistry from the California Institute of Technology in 1988, mentored by G.J. Wasserburg. Upon completion of his graduate studies, he took a position as an assistant professor at the University of Minnesota in the Department of Geology and Geophysics and has remained there since.

Edwards is well-known for his role in the development of modern uranium-thorium (or ^{230}Th) dating methods, applicable to the dating of carbonates that form at the earth's surface. Edwards and colleagues were the first to apply sensitive mass spectrometric techniques to the measurement of rare isotopes of uranium and thorium in natural materials. He and colleagues have continued to improve upon the original methodology, with major improvements coming in recent years. This work is built upon fundamental principles of analytical chemistry combined with mass spectrometry, including some modern instrumental refinements. Hallmarks of this research are (1) implementation of techniques that result in high ion yields, (2) development of measurement protocols that take full advantage of the high sensitivity afforded by these techniques, (3) meticulous standardization, (4) careful monitoring of analytical blanks, and (5) re-determinations of the half-lives of ^{230}Th and ^{234}U. The net result, as compared to traditional methods, is (1) a reduction of errors in age of more than an order of magnitude, (2) reduction in sample-size requirements of more than an order of magnitude, (3) significant improvements in the accuracy of ^{230}Th ages, and (4) a more than doubling of the range of time accessible to ^{230}Th dating (now the last 700,000 years).

^{230}Th dating is particularly important because it is one of few methods applicable to the last several hundred thousand years of earth history, a time that includes major shifts in climate, the last stage of human evolution, and historical cultural changes. ^{230}Th dating techniques have been and continue to be critical in establishing the timeline for this chapter in earth history. In addition to the direct dating of natural materials to ascertain this timeline, ^{230}Th dating has been invaluable in the calibration of the radiocarbon timescale. Thus, the calibration of the full radiocarbon timescale, a goal since Libby originally developed the radiocarbon dating method some six decades ago, is now in sight.

Edwards champions cave deposits as recorders of historic and pre-historic climate. Among other projects, he and his large international group of collaborators are currently working on piecing together hundreds of thousands of years of Asian Monsoon history from caves in China. Using innovative strategies, he relates his cave climate histories to those from ocean sediments and from ice cores, thereby establishing patterns of changing climate in time and space. His work helps us to understand the causes of abrupt climate change and the causes of the rapid melting of ice sheets at the end of glacial cycles. Some of his research assesses the relationship between climate change and cultural history, drawing plausible links between global shifts in rainfall patterns and major cultural changes. His cave records that cover the last several centuries contain some of the strongest evidence yet for human-induced climate change.

Edwards' achievements have been recognized with a number of awards. In 1999, Edwards was awarded the C.C. Patterson Medal by the Geochemical Society for outstanding research in Environmental Geochemistry. In 2004, he was elected Fellow of the American Academy of Arts and Sciences. In 2008, Edwards was elected Fellow of the American Geophysical Union and was also honored as the first recipient of the Science Innovation Award (the N.J. Shackleton Medal) by the European Association for Geochemistry. He was awarded a John Simon Guggenheim Fellowship in 2009. In 2011, he received the Arthur L. Day Prize and Lectureship from the National Academy of Sciences and was also elected a member of the National Academy of Sciences. He has published over 200 journal articles, more than 25 in the journals *Science* and *Nature*. According to the ISI Web of Knowledge, over the past decade, Edwards is among the top ten most highly cited earth scientists in the world.