AUSTIN LONG, 1937–2010

With the passing of Austin Long, our profession lost a productive and innovative researcher. Early in his career, Austin recognized the potential of isotope geochemistry as a tool for resolving problems in the earth sciences. Isotopes remained the unifying theme of his life's work. Synergy, also, was clearly important to Austin; he applied his expertise in isotopes in many fields, and with many collaborators. Last but not least among Austin's guiding principles were generosity and a strong sense of ethics.

Austin was a native of Wichita Falls, Texas. He began his university studies in his hometown, at Midwestern State University, graduating with a BS degree in 1957. He entered the Masters program at the Lamont Observatory of Columbia University, New York, and wrote a thesis on lead isotopes in the Coeur d'Alene district, Idaho. It may surprise some that Austin's first paper was published in *Economic Geology*. He proceeded to doctoral studies under Paul Damon at the University of Arizona, and in 1966 defended a dissertation entitled *Late Pleistocene and recent chronologies of lakes in Arizona and New Mexico*.

His first position was as a Senior Scientist in the Smithsonian's Radiation Biology Laboratory in Washington, DC from 1963 to 1968, with a concurrent affiliation as a researcher at the Geophysical Laboratory of the Carnegie Institution. In 1968, he accepted a position as Associate Professor at the University of Arizona, in the Department of Geosciences. He was promoted to Professor in 1987. His appointment eventually became a joint one between Geosciences and Hydrology and Water Resources. He retired as an Emeritus Professor in 1998.

The breadth of his research contributions was remarkable. Austin's career spanned the development of three different analytical methods for radiocarbon. He and his students published on improvements to all three techniques, and on the application of radiocarbon dating to archaeology, groundwater hydrology, paleontology, paleoclimatology, atmospheric chemistry, and solar physics. Austin served as Editor of the journal *Radiocarbon* between 1989 and 1999. In archaeology, he contributed to studies of Pleistocene extinctions, the domestication of corn, the Clovis culture and Native American sites in Arizona. He was responsible for collecting an unparalleled data set for stable isotopes in Tucson rainwater, event by event, over 23 years. He was interested in the application of isotope techniques to biological systems, and made fundamental contributions to what are now flourishing fields of research in tree-ring and packrat-midden studies. His expertise in groundwater isotope studies was recognized nationally when he was invited to participate in the evaluation of prospective nuclear waste disposal sites in North Carolina, California, and Nevada (Yucca Mountain). The development of a high-precision method for the measurement of stable chlorine isotopes in Austin's laboratory led to the application of the technique to natural systems in many other laboratories around the globe.

The placement of a professor's students speaks to his abilities as a teacher, and in this context Austin left an outstanding legacy. Several of his students have gone on to success in academia, while many more have flourished in consulting and government research organizations. His graduate students made such an impression with one consulting firm that the management repeatedly asked who would be next to graduate.

Earlier I mentioned Austin's generosity and ethical sense—qualities from which I learned and benefited as I began the second phase of my career. Austin's laboratories had a consistent reputation for producing good data and for fair treatment of clients. There was always room for visitors—in Aus-

tin's house, too—and the laboratories became an international crossroads where scientists from all over the world were welcome. Because the laboratories received state funding, Austin's policy was to give back to the community by self-funding beneficial research such as the Tucson Basin isotope study.

When retirement came along in 1999, the first signs of a health crisis had already appeared. Sadly, Austin was unable to enjoy most of his retirement as he might have wished, no doubt continuing his pursuit of favorite research topics. True to his devotion to science, he participated in research projects on Alzheimer's disease.

Austin is survived and greatly missed by his wife Karen, whose attentive care enabled him to live at home until his death, and by daughters Lara, Stephanie, Tonya, Kirsten, and Kathy. He is also survived by a host of professional disciples who will continue to benefit from his teaching and research for decades to come.

Chris Eastoe
Staff Scientist, University of Arizona, Environmental Isotope Laboratory

Austin loved to "tinker" in the best sense of tinkering. Whether it was maintaining his automobiles as a shade-tree mechanic or performing first aid on his mass spectrometers, he seemed to relish rolling up his sleeves and getting "under the hood" to replace parts or make necessary adjustments. I think this was emblematic of Austin's inherent inquisitiveness that reached far beyond hardware to his efforts to expose and exploit the theory and basis of the hydrological, biological, and atmospheric systems he was studying, commonly addressing problems through analysis of stable isotopes, cosmogenic isotopes, or radioactive-decay isotopes. He encouraged students to approach their research problems similarly, first developing an understanding of the fundamentals of the problem, imagining then designing the experiments to resolve the question, and bringing new or modified instrumentation and analysis to bear on the problem as necessary.

Many times in Austin's career, resolution of research questions involved radiocarbon or stable-isotope analysis of wood and tree rings. Improving the accuracy of radiocarbon dating by perfecting chemical pretreatment to remove contaminants motivated Austin's ^{14}C analysis of bulk ancient wood and tree rings of modern wood. Austin's stable-isotope analysis of tree rings began systematically in the 1970s (with Terry Mazany and Juan Carlos Lerman) to develop a modern tree-ring $\delta^{13}C$ chronology from dated ponderosa pine tree rings from Flagstaff, and with $\delta^{13}C$ analysis of dated tree rings about 1000 yr old from archaeological sites. In both projects, Austin was interested in testing for climate and atmospheric $\delta^{13}C$ signals in tree-ring isotopes that could be used for reconstructions. I came along at the end of the 1970s and became Austin's PhD student working on tree rings. A recently completed dissertation by another of Austin's students at the time, Larry Arnold, had already found strong climate signals in the $\delta^{13}C$ of juniper leaves in Arizona (related to Austin's interest in extracting climate signals in plant matter isotope composition from packrat middens going back tens of thousands of years). This became the basis of my dissertation research on removing climate effects in the $\delta^{13}C$ of juniper tree rings to isolate a record of atmospheric $\delta^{13}C$ before direct measurements were routinely done fairly late in the 20th century. This was just the beginning of many tree-ring projects in which Austin and I were involved over a 20-year period, in which he provided ready access to a mass spectrometer after I left Arizona.

In several of these projects, I had the good fortune of going in the field with Austin to collect tree-rings samples with chain saws and increment borers. I don't know if Austin was ever a Boy Scout, but he always seemed to be prepared when we camped, and he reintroduced me to the delicious joys of cooking breakfast with butter (which I had previously abandoned because of the initial saturated-fat health scares). Another of Austin's traits from the research setting was also particularly valuable during these experiences, namely his patience and measured determination in resolving the day-to-day logistical problems we encountered.

I feel fortunate to have had interactions with Austin over these many different levels and in a variety of venues for several decades—he provided leadership by excellent example.

Steve Leavitt
Professor, University of Arizona, Laboratory of Tree-Ring Research

Austin Long ushered in a new era at *Radiocarbon* when he became Editor in 1989. He took over for Minze Stuiver, who had been at the post for 12 years. In his first editorial (Vol. 31(1), 1989), Austin wrote that he had "a hard act to follow." However, he dove in and with veteran Managing Editor Renee Kra, moved the journal from Yale in New Haven, Connecticut, to the University of Arizona in Tucson.

In his first issue, Austin announced that the journal would feature an "expanded outlook" and an expanded title: *Radiocarbon: An International Journal of Cosmogenic Isotope Research*. (It had been a supplement to the *American Journal of Science*.) Austin and Renee aimed to "extend the journal's scope and diversification," putting less emphasis on publishing date lists and more on the interdisciplinary uses of ^{14}C. *Radiocarbon* would print more special volumes and conference proceedings and include book reviews, discussions, advertising exchanges, and announcements.

A new governing board reflected the journal's expanded focus. It included scientists from the fields of geosciences, anthropology, tree-ring research (dendrochronology), accelerator mass spectrometry (AMS), and archaeology. *Radiocarbon* would also encourage submissions from the fields of climatology, global change, and paleoecology.

Not long after Austin took the helm as Editor, *Radiocarbon* and the University of Arizona Department of Geosciences had the honor of hosting the 14th International Radiocarbon Conference in Tucson in 1991. Austin and Renee oversaw the publication of that conference proceedings issue, and over the next several years, produced numerous special volumes and proceedings for conferences in related fields (LSC, dendrochronology, archaeology, etc.).

Austin became an Emeritus Professor in July 1999 and stepped down from his position at the journal. Tim Jull took over as Editor after being on board as Consulting Editor since 1994. I was Assistant Editor from 1993 to 1999 and then Managing Editor until 2003. During my years working with Austin, I remember him as fair-minded, calm, and diligent. Although Austin wasn't one to toot his own horn, he made major changes and improvements to the journal, and his fingerprints are all over *Radiocarbon* to this day.

Kimberley Tanner Elliott
Assistant Editor and later Managing Editor of *Radiocarbon*, 1993–2003

Although I was never formally a student of Austin Long's, I remember him best as a careful and patient teacher. I joined *Radiocarbon* as an assistant editor in 1993 with a background in English literature and linguistics and experience as a university press copyeditor, but no more than an average high-school knowledge of the physical sciences. I knew that ^{14}C was an isotope of carbon that decayed at a known rate and could therefore be used for dating, but that was about it; calibration curves, the Maunder minimum, the difference between traditional decay counting and AMS dating, were mysteries that I set about trying to unravel. Typically, when Austin would stop by the *Radiocarbon* office I'd test out my understanding of one topic or another by asking him questions that must have seemed painfully basic, but he would invariably answer them cheerfully and clearly. He was also the first person I remember talking with at length about greenhouse gases and global warming, and I've often thought that if more of my fellow citizens could have had the experience of listening to his matter-of-fact outlining of the evidence for anthropogenic climate change they'd think about the topic more sanely. I'm glad to have had him as a colleague and as my introduction to the working life of a research scientist.

David Sewell
University of Virginia Press, Charlottesville, Virginia, USA
Assistant Editor and later Managing Editor of *Radiocarbon*, 1993–1999

Austin Long (right) with David Sewell and Kimberley Tanner Elliott at the 16th International Radiocarbon Conference in Groningen, the Netherlands, June 1997.