

Memorial to Charles L. “Chuck” Pillmore (1930–2003)

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The geological community lost an outstanding contributor late in 2003 when Charles Lee “Chuck” Pillmore died at the age of 73. A scientist of diverse accomplishments, his interests ranged from photogrammetry to paleontology and from bedrock geology to the impact event at the Cretaceous-Tertiary (K-T) boundary.

Chuck Pillmore was born April 7, 1930, in Boulder, Colorado. He grew up in the Boulder and Lafayette area, where the nearby Rocky Mountains must have subtly inspired his love of geology. When he first attended the University of Colorado in Boulder, he began a program in electrical engineering, but his interest in that was short-lived. The field that would become his profession soon attracted him, and he graduated with a degree in geology in 1952. He went on to complete a Master’s degree in geology in 1954, with a thesis on the petrography and petrology of part of Mount Sopris in western Colorado. He began his career with the U.S. Geological Survey (USGS) that same year, and he remained with the USGS nearly 40 years, until retirement in 1993. For Chuck, retirement meant only that he could devote himself to an unencumbered pursuit of geologic research as Scientist Emeritus with the USGS, and some of his most fulfilling work was conducted during the last ten years of his life.

Chuck was a beloved husband, father, and grandfather, as well as a respected and admired colleague. His memory will be forever treasured by his wife of 49 years, Arlene, their son, Roy, their daughter, Kathryn, and seven grandchildren. Karen, their oldest, lost her valiant battle with cancer in 2001.

Chuck traveled the world, but he had a special penchant for Mexico and South America. He delighted in the food, the music, and the culture of that region, and he became proficient in conversational Spanish. As often as possible, Chuck took his family along on his travels, and they frequently joined him while he was conducting field work. He instilled in them the joy of learning and a fascination with the natural world. They came to share a deep appreciation of the rocks and landforms of the Raton Basin of southern Colorado and northern New Mexico. Daughter Kathy recalls him pointing to a feature and saying, “See that hill over there, the one with the black rock around? Millions of years ago that was an active volcano with lava being spewed out all over the land around it.” On another occasion, while he was mapping coal resources in the basin, he asked, “See that black layer in the rocks? Millions of years ago, this area was covered with plants and palm trees and a big swamp. Imagine dinosaurs roaming all over this area.” Chuck had a way of capturing people’s imaginations and making geologic history real. He enjoyed teaching people of all ages, and the world was the classroom for his children, his grandchildren, college students, and colleagues. He never tired of leading scientific field trips to show the wonders of the geology of the Raton Basin. Shortly before his death, Chuck began work on a Web site that should permit



those lacking a personal guide to conduct their own field trips to some of the basin's most important geological features: exposures of the K-T boundary, which Chuck discovered. The URL for that site is <http://climchange.cr.usgs.gov/info/kt/>.

Chuck's professional career began with the USGS in Washington, D.C., but after a short time he transferred to the Denver Federal Center in Colorado, where he remained for the rest of his career—except for a two-month temporary assignment in Mexico City in 1960 and field seasons doing geologic mapping in Kentucky in the mid-1970s. His work in Washington, D.C., and Mexico City, and much of the time in Denver, focused on photogrammetry, the use of aerial photography in geologic mapping. Chuck became an internationally known expert in the field, and he obtained two patents for devices used in photogrammetry: the exaggeration profile plotter and the universal tracing table. For many years, he was head of the USGS's Photogrammetric Plotter Laboratory in the Denver office, and he established similar facilities in the Survey's Reston, Virginia, and Menlo Park, California, centers. He developed computer-supported photogrammetric mapping systems and methods for digitizing geologic maps. He applied these techniques to assist him in mapping coal deposits in the Raton coalfield of northern New Mexico. A true field geologist, however, Chuck also mapped the coal beds and other rocks of Precambrian to Holocene age on the ground, and it was not unusual to find him on horseback.

In the late 1970s, Chuck digressed from field and laboratory-based geologic studies and served as the head of the USGS Technical Reports Unit in Denver. In that position, he served as chief editor, responsible for the review and processing of the scientific reports and maps that are the USGS's primary products. Always the inveterate innovator, Chuck introduced digital word processing to the writing and editing procedures, methods that are now used so extensively that their origins tend to be forgotten. On several occasions during that period, he also served as acting chief of the USGS Office of Scientific Publications in Reston.

Returning to geologic research and mapping in the early 1980s, Chuck continued to investigate the rocks and resources of the Raton Basin. Working with USGS colleagues, he utilized geochemistry, paleomagnetism, and palynology to develop a better understanding of the origin and nature of the rocks of the area, especially those of Late Cretaceous and early Tertiary age. From these efforts, he was well positioned to participate in one of the most exciting scientific discoveries of recent times, gathering evidence of an extraterrestrial impact at the end of the Cretaceous Period, about 65 million years ago.

Chuck worked with scientists of the Los Alamos National Laboratory and others to locate the first known iridium anomaly in nonmarine rocks, which was identified in a drill core from the Raton Basin. This was only a year after the initial discovery of iridium in marine rocks at distant places around the world led to publication of the now well-known theory that impact of an asteroid contributed to the extinction of dinosaurs and many other species of animal and plant life at the end of the Cretaceous. Using his knowledge of the field geology of the basin and continuing to work with colleagues from Los Alamos and the USGS, Chuck went on to discover 25 or more outcrop localities of the K-T boundary in southern Colorado and northern New Mexico. Chuck lectured widely on his discoveries at national and international meetings in the years following these discoveries, and he led numerous field trips for local, national, and international participants to visit the localities.

In more recent years, Chuck's K-T boundary field trips also included a stop at another remarkable discovery of his, the footprint of the dinosaur *Tyrannosaurus rex* in sandstone in northern New Mexico. Chuck came upon this unique track in 1983, but it was not until ten years later that the true nature of the fossil footprint was realized and documented. The track and the block of sandstone encasing it, weighing several tons, are still in place, but Chuck made and distributed realistic fiberglass casts. These unique casts are on display in several locations,

including USGS headquarters in Reston, the USGS library at the Denver Federal Center, the Geological Society of America headquarters building in Boulder, Colorado, and in museums throughout the region.

Chuck often remarked that “the most beautiful view in Colorado is looking south from Raton Pass”—that is, into the New Mexico part of the Raton Basin. He loved the area he had studied for so much of his professional life. He prized its scenery, its geology, and its many wonders still to be investigated. In his retirement, he continued studies of the ages of the lava flows, the evolution of the landscape, and the fascinating deposits at the K-T boundary. Acquiring property in the Raton area of New Mexico, he and Arlene bought a home on a beautiful piñon and juniper-covered ridge situated in Tertiary strata above the K-T boundary, with a magnificent vista of his favorite part of the basin. His ashes are now scattered on that ridge, near that most precious home, which he named “Legacy.”

The publications of Charles L. Pillmore include more than 90 technical papers, geologic and photogeologic maps, guidebooks, and open-file reports. His technical papers appeared in various professional journals, including *Science* and *Nature*, in USGS Bulletins, and in Geological Society of America Special Papers, among others. He and his coauthors published 135 abstracts summarizing their presentations at national and international meetings. Chuck was also active in professional societies. He was a member of the American Society of Photogrammetry and Remote Sensing, the Colorado Scientific Society, the Geological Society of America, the Geological Society of Washington, the New Mexico Geological Society, and the Rocky Mountain Association of Geologists. He was a past president of the Colorado Scientific Society and a Fellow of the Geological Society of America.

Chuck Pillmore was honored for his research by the U.S. Department of the Interior, which presented him with its Meritorious Service Award in 1988. The dinosaur track he discovered was named for him, *Tyrannosauripus pillmorei*. His most exclusive honor was to have an asteroid named for him, Pillmore 4368. That asteroid is still in orbit in the heavens, and it is a most fitting and lasting tribute to a truly extraordinary individual.

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