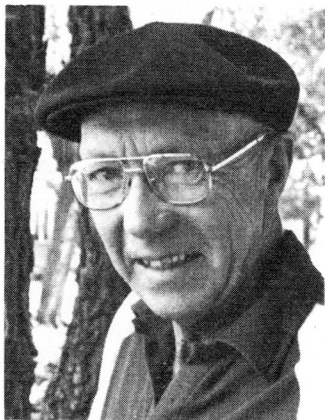


Memorial to Max D. Crittenden, Jr. 1917–1982

V. R. TODD, J. E. PIKE, AND D. M. MILLER
U.S. Geological Survey, Menlo Park, California 94025



Max D. Crittenden, Jr., geologist with the U.S. Geological Survey, died November 25, 1982, in Redwood City, California, after a 6½-year fight against cancer. Max had spent most of his 40-year-long career with the Survey identifying and assembling pieces of a fascinating geological puzzle—the eastern Basin and Range province and the adjoining Wasatch and Uinta Mountains. He continued field work through the summer of 1982. The geology and the beauty of the mountains, deserts, and valleys, as well as the well-being and work of his colleagues remained foremost among his concerns up to the end of his life.

Max was born in Seattle, Washington, on May 12, 1917. In 1927 he moved with his parents and brother Jim to California, the state he would come to know

and love as a geologist, naturalist, and active conservationist during his years in the San Francisco Bay area. Max entered San Jose State University in 1935 with the intention of majoring in chemistry. A beginning course in geology taught by Dr. Fred Buss, then the head of the geology department, radically changed the direction of his professional life. He subsequently earned his B.A. degree in geology, with minors in biology and chemistry, from San Jose State in 1939. That geology course had a second and perhaps more important impact on the direction of Max Crittenden's life: On a field trip he met Mabel Buss, a student in the same class and the professor's daughter. Max decided that this was the woman for him when he saw Mabel driving a 1929 Packard down a wash in Death Valley. Max and Mabel were married in 1942, the beginning of a joyful, lifelong collaboration. Mabel and the couple's four daughters camped with Max during many summer field seasons in the high Uinta and Wasatch Mountains of Utah. Their camp became a well-known home base for visiting field geologists who were assured of good company and first-rate geologic discussions.

Max began his doctoral research in 1939 at the University of California, Berkeley. He worked for the U.S. Geological Survey intermittently from 1942 until 1949 when he received his Ph.D. degree. His doctoral research involved mapping of the San Jose and Mount Hamilton quadrangles in California, including the New Almaden Quicksilver Mining District. During these years Max also mapped manganese deposits in California and Utah for the Survey as part of the Strategic Minerals Program. As a result of this work, he became one of the nation's leading authorities on the geology of manganese deposits, and he served for many years as manganese commodity geologist for the government.

In 1946 Max joined Frank Calkins in a mapping project in the Wasatch Mountains, Utah, and in 1953 he became chief of the project. At the time Max began this work,

low-angle faulting was largely unrecognized in the Wasatch. Max and his co-workers demonstrated that thrust faults in this region have juxtaposed stratigraphic sequences derived from widely separated parts of the Cordillera. Max's elegant maps of these complex structures and his detailed studies of Precambrian and Paleozoic stratigraphy stand as models for field geologists. These maps helped to form the foundation of our present knowledge of the complex structural relations in the Idaho-Wyoming-Utah thrust belt, and they were essential to the recognition of the continuity of the Mesozoic Cordilleran foreland thrust belt.

In the mid-1960s Max began to focus on the problems of the tectonic origin and source regions for the great thrust sheets of the overthrust belt. He was inspired by the pioneering studies by Peter Misch and his students of decollement thrusts that lay near the Utah-Nevada border. While continuing his own mapping in north-central Utah, Max inspired and supported mapping projects in eastern Nevada and western Utah, the so-called hinterland of the thrust belt. He became informal coordinator of studies in northwestern Utah for Survey, state, and university geologists. It was in large part due to his fostering of collaborative studies by geologists that the Tertiary overprinting of Mesozoic hinterland geology by plutonism, metamorphism, and low-angle faulting was clearly revealed. In 1977 Max was the leading convener of a Penrose Conference on the newly recognized hinterland metamorphic core complexes, an enigmatic belt of isolated, uplifted, metamorphic complexes that extends from Canada to northwestern Mexico. This conference brought together workers from all parts of the Cordillera to discuss the origin of Cordilleran metamorphic core complexes and possible relations between these hinterland metamorphic rocks and the thrust belt to the east. This conference was followed by a Geological Society of America symposium, organized by Max, on the same subject. Along with Peter J. Coney and George H. Davis, in 1980 Max edited a Geological Society of America Memoir on Cordilleran metamorphic core complexes. This memoir extensively documented an early to middle Tertiary extensional tectonic event in the Basin and Range province, a subject of intense debate at the present time. Max's most recent mapping in the Promontory Range, Utah, promised to clarify further the relations between hinterland structures and the overthrust belt. Max was also guiding the publication of a number of regional synthesis maps, a role for which he was uniquely suited.

In 1982 more than 30 of Max's colleagues contributed papers to a Geological Society of America Memoir dedicated to Max. The papers covered a wide spectrum of current research in the eastern Great Basin. Max touched the lives of most, if not all, of the contributors by directly sponsoring and supervising young researchers in the Survey, particularly in the postdoctoral Research Associate Program, by his unflagging enthusiasm and interest, and by generously sharing his time as informal advisor and field visitor. As a kindly but relentless manuscript reviewer, Max also shared his considerable writing talents (in part the heritage of his close association with Frank Calkins); his own reports are models of brevity, clarity, and organization. Because of its wide range of research topics, this Eastern Great Basin Memoir is a fitting tribute to Max, whose scientific interests and contributions span all of the major specializations in geology today. His colleagues presented bound volumes of the papers to Max a few weeks before his death and, not surprisingly, later learned that family members, at Max's request, had read aloud to him from the volumes while he was hospitalized.

Max Crittenden's service to the U.S. Geological Survey went far beyond the excel-

lent performance of his own project duties. He helped to provide continuity in Survey philosophy and traditions by fostering discussions and reminiscences with retired Survey colleagues, and he strengthened the Survey through his many administrative roles. From 1965 to 1969 he helped to shape the Survey's regional mapping program as Chief of the Branch of Southwestern States. Since 1972 he was a member of the Geologic Names Committee, specializing in problems of Precambrian geology and nomenclature. He served as Chairman of the Federal Interdepartmental Geothermal Environmental Advisory Panel from 1974 to 1978. For his service to the Survey and to the country, Max was awarded the Department of the Interior's Meritorious Service Medal in 1979.

In addition to his love for geology, Max was active in his local community. He was a leader in the fight against the teaching of creationism in California public schools. His many interests included architecture, wine-making, house-building, and weaving, and he was greatly concerned with the protection of the environment. He and Mabel were deeply involved with the Sempervirens Fund, dedicated to the preservation of local redwood forests, and Max also served on the Board of Directors of the Committee for Green Foothills in 1981 and 1982. Chief among the Crittendens' greatest enthusiasms were four trips that Max and Mabel took down the Grand Canyon of the Colorado River through Grand Canyon National Park in New England fishing dories. During the summer of 1982, Max and Mabel spent six weeks in Europe where they visited a German botanist in the Austrian Alps and sailed the Mediterranean with Max's brother, Jim Crittenden. Upon their return, Max worked at the Survey until a few weeks before his death. His last professional activities were informal bull sessions with Survey and university researchers (the Utah-Nevada "mafia") whose purpose was to amend evolving regional structural hypotheses in the light of the participants' latest field seasons in the eastern Great Basin.

Max participated in many scientific societies, principally the Geological Society of America, of which he was elected a Fellow in 1958 and for which he served as Assistant Editor since 1979. He was awarded San Jose State University's Distinguished Alumnus Award in 1982. His expertise in late Precambrian rocks of western North America gained him recognition in the international geologic community as well; he was invited to speak at the Symposium on the Correlation of the Precambrian in Moscow, USSR, and in 1978 he and John C. Crowell organized and conducted an IGCP Field Conference on late Precambrian rocks here and abroad.

Max spent only one semester, 1969-70, as acting professor of geology at the University of California, Santa Cruz, but throughout his career at the Survey he was an educator in the best sense of that word. He gently led many a geologist down the path of clear and incisive scientific thought. Max was the colleague to whom we learned to turn with questions and wild ideas or for help with report writing. He was a treasure-house of information about Cordilleran geology long before the computer age, but he combined this knowledge with human warmth. The scientific curiosity, enthusiasm, and sense of wonder that sparked his career as a geologist, implemented by clear thinking, patience, and attention to detail, made Max a superb geologist. Those of us fortunate to work with him also knew of his gentleness and his rare degree of openness to new ideas. Max Crittenden's untimely death leaves a large void at the Survey and in the geological community. It is for his open exchange of ideas and information and as the quintessential field geologist, nimbly moving ahead on sneakered feet, that we will remember Max Crittenden.

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