

## Memorial of Charles A. Anderson 1902–1990

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Charles A. Anderson, a distinguished geologist of the Geological Survey and the University of California, died in Pomona, California, on January 9, 1990. He was best known to friends as Andy.

Andy was born in Bloomington, California, near Riverside, on June 6, 1902. His mother, Mary Eliza (Lyman) was the first-born child of one of the apostles of the Mormon Church, but she left the church when she moved to California. His father, Emil Anders Andersson, emigrated from Sweden to the United States and later from the East Coast to Bloomington, California.

Andy credited his mother with stimulating his interest in education. His favorite subject was mathematics, which was good preparation for the junior college he attended in Riverside after completing high school. An early enthusiastic teacher was Dr. Julian W. Eggleston, who had studied at Amherst and Harvard. Eggleston encouraged further study in geology at Pomona under A. O. Woodford, famous even then as a one-man department. Andy was helped financially by a teaching assistantship at Pomona as well as by hard work in the nearby orange groves. After his bachelor's degree from Pomona in 1924, he began graduate study in mineralogy at the University of California, Berkeley.

Andy soon learned that field geology was more appealing to him than laboratory work. He joined a U. C. professor, George Lauderback, for a summer of field mapping in Utah. At Berkeley, he instructed in petrology and petrography and started Ph.D. field work on the puzzling copper mines of Plumas County. His surface and underground mapping revealed that the copper ores were controlled by planar structures cutting different rock types and hydrothermally introduced after the enclosing rocks had formed. Adolph Knopf, a widely respected professor at Yale, was restudying the copper deposits for the Geological Survey and was consulted on Andy's conclusions. The two were so nearly in agreement that they published a joint paper in 1930.

Andy's Ph.D. was granted in 1928, and he felt honored by being asked to join the Berkeley faculty the following year, beginning his climb up the academic ladder to associate professor in 1938. His interests then shifted to young volcanic rocks, first on the olivine basalt of Cinder Cone east of Mount Lassen. Quartz crystals in the basalt were inherited from intruded rocks and were not in equilibrium with the basalt melt.

Widely quoted papers produced during this young volcanic phase of his career included *Origin of the Volcano Breccias of the Tuscan Formation* (1933), *Volcanic History of the Clear Lake Area of California* (1936), *The Hat*



*Creek Lava Flow* (1940), and *Volcanoes of the Medicine Lake Highlands* (1941).

His field interests expanded to include thrust faults in Nevada, with C. W. Merriam, then of Cornell (1942), and the origin of the Gulf of California (1950), collaborating with oceanographers of Scripps Institute of Oceanography, indicating a mid-Tertiary age for splitting of the Gulf.

By 1942, students at Berkeley had decreased greatly because of the War effort. In September he was offered work with the Geological Survey's strategic mineral program on molybdenite and then the moly-containing porphyry copper deposits of Arizona and nearby states.

As the end of the war neared in 1945, he had to choose between returning to Berkeley as an academic or remaining on the interesting study of massive copper and other sulfides in old pre-Cambrian volcanic rocks near Jerome, Arizona, which he had started in 1945 with S. C. Creasey, and continued with Lee Silver and Tom Stern, both specialists in dating of old metamorphic rocks.

In 1953 Andy accepted the administrative job as chief of the large Mineral Deposits Branch, while his valued assistant, Creasey, returned to Arizona. As branch chief, he selected Walter S. White and, two years later H. L. James as his assistants. He initiated a policy of visiting all branch field projects. His commitment as branch chief was completed in 1958, but he was soon asked by Director T. B. Nolan to be the new Chief Geologist. He accepted, provided that he could also do summer field geology in Arizona. He thoroughly enjoyed being branch chief in close contact with field geologists, but the job of Chief Geologist was less to his liking because it involved too much political maneuvering. At the end of his specified tour of duty, he and Helen moved in 1964 to the new Survey center in Menlo Park, California.

Field resolution of the pre-Cambrian problems of Arizona was not yet satisfactory, so he turned to Tom Stern, Lee Silver, and Cy Creasey. A syngenetic vs. epigenetic origin of the base metals in basaltic rocks was still unresolved. In 1970 he attended a conference in Japan on similar young rocks in a shallow marine environment. Somewhat grudgingly, he became convinced that the metals in both old and young rocks were essentially syngenetic in marine volcanic piles.

Andy was delighted to have a new sodium-calcium uranyl carbonate mineral named after him, provided that the finder (Anderson) did not choose to be coauthor of the description. Andersonite has since been found in other oxidized uranium deposits.

Many honors have been bestowed on him, including Phi Beta Kappa, Pomona, 1924; Sigma Xi, University of California, Berkeley, 1928; Fellow of the Geological Society of America, 1933; Councillor of the Geological Society of America, 1946–1949; member of the Society of Economic Geologists (Vice President, 1959, President, 1968, recipient of the S.E.G. Penrose Medal, 1974); member of the National Academy of Science, 1957; and honorary Ph.D., Pomona College, 1960.

Andy was happily married to Helen (Argall) of Sacramento, in 1927, and a son, Robert (now deceased), was born in 1928. He is survived by Helen, three grandchildren, and two great-grandchildren.

He retired March 31, 1972, taking special pride that his desk was clean and all major obligations completed. He and Helen moved to the University of California, Santa Cruz campus in 1973, where he took much pleasure in consulting with students and faculty, his garden of roses, and bird watching. Helen has said that the first signs of Alzheimer's may have appeared during this time. They moved to a retirement home in Pomona in 1979 to be near their son, Robert.

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