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ADOLPH KNOPF

1882—1966

A Biographical Memoir by
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Biographical Memoir

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BY CHESTER R. LONGWELL

ADOLPH KNOPF was born in San Francisco, California, December 2, 1882. Both parents were migrants from Germany. The father, a building contractor, acquired a ranch about twenty-five miles to the south, in open country along the San Andreas fault zone. In later years Adolph remembered the time spent on the ranch, during summers and holidays, as the most enjoyable part of his youthful experience. On his retirement from Yale University in 1951, he and his wife Eleanor made their home at a pleasant site in the hills of Woodside only a few miles from the location of the old ranch.

On reaching college age, Adolph entered the University of California at Berkeley. Boyhood interest in the open country no doubt played a part in the choice of geology as his major subject of study. Andrew C. Lawson had started his notable career as Professor of Geology at Berkeley in 1890, and largely under his tutelage Adolph began his mastery of petrology, ore deposits, and other aspects of Earth Science. His profound respect and personal liking for the old master continued until Lawson's death in 1952.

After completing undergraduate requirements in 1904, Adolph began graduate study at Berkeley and was awarded the M.S. degree in 1905, the date also of his first publication. In

undergraduate years he and other students were introduced by Lawson to one of his favorite geologic haunts, a rugged part of the Sierra Nevada including the headwaters of Kern River. Adolph and a companion, Paul Thelen, spent considerable time in the upper Kern basin and prepared a report with the title "Sketch of the Geology of Mineral King, California." This first venture into print was based on field study and mapping of a sizable area in which plutonic igneous bodies are intrusive into sedimentary and metamorphic rocks, with related development of ore minerals. Similar geologic materials and problems were to claim the attention of the senior author in numerous subsequent field projects.

In 1906, with resident graduate study completed, Adolph accepted appointment as Geologic Aide with the United States Geological Survey. His first assignment for field work was in Alaska, at that time a territory with its geology largely unknown. The chief of his field party, Louis M. Prindle, was a small man physically but exceptionally capable and vigorous. In the long summer days near the Arctic Circle his party was awakened at 4 A.M. and continued work to a correspondingly late hour in the evening; long work days were to compensate for short field seasons. Mineral deposits were a prime objective of the field program, and in the course of five successive seasons Adolph saw and studied many kinds of ore deposits, at locations ranging from the Seward Peninsula to eastern parts of Alaska. He had particular interest in tin deposits of the Seward Peninsula, on which was based a report accepted at Berkeley as his doctoral dissertation in 1909. Together with Waldemar Schaller, a companion during one field season, he discovered in a Seward ore-complex two new borate minerals. To one of these they assigned the name *hulsite*, in honor of the Alaskan geologist Alfred Hulse Brooks; the other mineral was named *paigeite*, in recognition of their young friend Sidney Paige.

Adolph's merit was recognized by advancement in grade through assistant geologist to geologist within six years of his first appointment as aide. His record reflects energetic enthusiasm in his work. Summers were devoted to field projects, other months to preparation of reports. After the five seasons in Alaska he was assigned by the Geological Survey to study the mining district between Butte and Marysville, Montana, a distance of nearly 100 miles. In that field project he made acquaintance with the Boulder batholith, a major feature that occupied much time and thought in his later years. After the Marysville experience he attacked varied field problems in Nevada and in his native state, California. His record in completing projects is notable. For each of the fifteen years 1905 through 1919, his bibliography lists from one to six titles. Many of the papers concern varied aspects of minerals in ore deposits. One, however—a professional paper devoted to the Inyo Range and the southeastern part of the Sierra Nevada—presents a broad vista of major geologic problems that still command wide interest.

Through much of his full-time career with the Geological Survey, Adolph made his home in Washington, D.C. In 1908 he was married to Agnes Burchard Dillon; three daughters and a son were born to them. The wife died in November 1918, victim of a widespread influenza epidemic. About a year later Adolph accepted appointment to the faculty of Yale University; his teaching career there began in January 1920. In June of that year he was married to Eleanor Frances Bliss, daughter of General Tasker H. Bliss, herself a geologist with an established reputation. They made their home in New Haven until Adolph's retirement in 1951. He kept a part-time connection with the U.S. Geological Survey until 1945, and with Eleanor as field companion he spent many summer seasons of field study in western states.

At Yale his teaching program was varied, for a time including a course for advanced undergraduates with the title "Geology of the United States." Much of his attention, however, was given to graduate students whose interests were in petrology. He had exceptional ability in directing microscopic study of thin sections, with emphasis on the broad implications of rock compositions. Outside formal classroom hours he devoted much time to discussing special problems with individual students. As a master of the German language he was of course entrusted with examining students for the reading requirement in German. In the period 1933-1950 he was Director of Graduate Studies in his department, a function requiring close liaison with other faculty members as well as with students. His abilities in teaching and research were recognized by advancements in rank. Appointed in 1920 as Associate Professor, he became a Professor in 1923, was awarded the Silliman Professorship on retirement of the incumbent in 1937, and a year later was made a Sterling Professor, a title of special distinction in the Yale Faculty.

During his early years in New Haven he devoted considerable time to completing some Geological Survey projects started when he was based in Washington. A notable example is his contribution on the Mother Lode gold belt of California. F. L. Ransome, whose general report on that district appeared in 1900 as U.S.G.S. Folio 63, wished to have the treatment refined and updated. In 1915 he assigned Adolph to the task of re-studying the complex belt, 120 miles long, with emphasis on the gold-bearing quartz veins. After the initial season, funds to continue the field work were not available until 1924. The report, published in 1929 as Professional Paper 157, is a classic in its field, portraying the kinds and relations of complex bed-rock units transected by an intricate network of mineral veins and faults.

His strong interest in intrusive igneous bodies led to a study of the Spanish Peaks district in southeastern Colorado. Part of that remarkable area had been mapped on a small scale by R. C. Hills. Using Hills's results as a basis, in 1932 the Knopfs began a field study with emphasis on modes of emplacement of the varied igneous bodies, the variations in their compositions, and relative dates of emplacement. Publication of the results in 1936 marks the beginning of a lengthy sequence of studies devoted to plutonic igneous bodies. Adolph's early work in the mineral district between Butte and Marysville, Montana, inspired him with a desire to study the great Boulder batholith and related igneous masses. Following the experience at Spanish Peaks he and Eleanor spent many summer seasons, including that of 1966, with headquarters at Helena and major attention focused on the igneous geology. Products of the studies are available in several publications of great interest.

At Yale Adolph had a group of close acquaintances in the faculty, including not only scientists but members of departments in varied disciplines. Classicists with whom he associated persuaded him that the spelling *batholith* involves an unfortunate distortion of the Greek root. Following their judgment, in his later publications he used the form *bathylith*. He was happy to meet the chemist B. B. Boltwood, who in 1907 had demonstrated that lead is a product of slow disintegration of uranium and suggested that proportions between uranium and thorium and associated lead can be used to determine ages of the containing rocks. Among results from his first analyses Boltwood announced an age value of 2,200 million years for a mineral from Ceylon. At the time of this announcement, the estimate by Joly and Clarke of 100 million years for the age of the ocean was widely accepted as a first approximation to the age of the earth. In 1913 Arthur Holmes, reviewing results of Boltwood and others, proclaimed his strong indorsement of the

higher age values. Barrell in 1917 accepted the time estimates based on evidence from radioactivity; and Adolph, shortly after his arrival in New Haven, announced his convictions in favor of the results from study of lead isotopes. In a paper entitled "The Age of the Earth," published in 1931, he championed the view that earth-history began more than 2,000 million years ago. With continued study of accumulating data, the figure he accepted for length of geologic time grew larger. In 1949, when he took part in a symposium "Time and Its Mysteries," he cited an age value of 2,200 million years for minerals in a pegmatite body in Canada that is intrusive into older rocks. Eight years later, in a paper entitled "Measuring Geologic Time," he agreed with Holmes that the earth was born at least 4,500 million years ago.

Inspection of the Knopf bibliography reveals exceptional growth of his interests in breadth and depth. Early papers are concerned largely with locations and descriptions of rock masses and mineral deposits. Later he became intrigued with the problem of balance in the earth's crust and compiled an exhaustive bibliography of isostasy, a contribution in a field advanced by Joseph Barrell, who preceded him at Yale. Studies of the Spanish Peaks complex and the Boulder batholith involve major problems of igneous activity in the earth's crust. Two papers on geosynclinal theory express his concern with problems of crustal deformation and mountain history. Such major concepts, with continuing attention to geologic dating, occupied much of his thinking in his later years.

After retirement from Yale and return to his native California, Adolph was welcomed into the School of Earth Sciences at Stanford University, first as Visting Professor, later with the title Consulting Professor. There through his final fifteen years he was an element of strength in the teaching staff, much appreciated by advanced students. Retired status brought no

fundamental change in his program; he was in the field each summer, the remainder of the year at Stanford, engaged in his own research and informal teaching activities. Groups of geologists, taking advantage of his superior knowledge of geology in parts of Montana, used his services as guide and instructor in successive field seminars.

In 1959 he was recipient of the Penrose Medal awarded annually by the Geological Society of America, which he had served as President in 1944. Before retirement he was active also in other professional societies. Honorary societies to which he was elected include the National Academy of Sciences (1931) and the American Academy of Arts and Sciences.

In the two universities that he served so well the name of Adolph Knopf is now on permanent record in practical form. He arranged for generous endowment of a professorship at Yale, and with his wife he established at Stanford a liberal Graduate Fellowship in Petrology.

After a brief illness Adolph passed away November 23, 1966, nine days before his eighty-fourth birthday. Numerous close friends who survive him include many of his former students, who agree that his apparent shyness and reserve on first acquaintance did not for long conceal his warm, helpful personality. Those who knew him well will keep in mind his tall, well-built physique, his thoughtful features, and his astonishing memory which retained details of his wide experience and broad reading. These friends mourn his passing, but are happy to have been associated with this man of exceptional ability and fine character.

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KEY TO ABBREVIATIONS

Am. J. Sci. = American Journal of Science

Am. Mineralogist = American Mineralogist

Bull. Dept. Geol. Univ. Calif. = Bulletin of the Department of Geology,
University of California

Bull. Geol. Soc. Am. = Bulletin of the Geological Society of America

Econ. Geol. = Economic Geology

J. Wash. Acad. Sci. = Journal of the Washington Academy of Sciences

Mining Sci. Press = Mining and Scientific Press

Sci. Monthly = Scientific Monthly

U.S. Geol. Surv. Bull. = United States Department of the Interior,
Geological Survey, Bulletin

U.S. Geol. Surv. Mineral Resources of the U.S. = United States Department
of the Interior, Geological Survey, Mineral Resources of the
United States

U.S. Geol. Surv. Profess. Pap. = United States Department of the
Interior, Geological Survey, Professional Paper

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