

NATIONAL ACADEMY OF SCIENCES

JAMES GILLULY

*1896—1980*

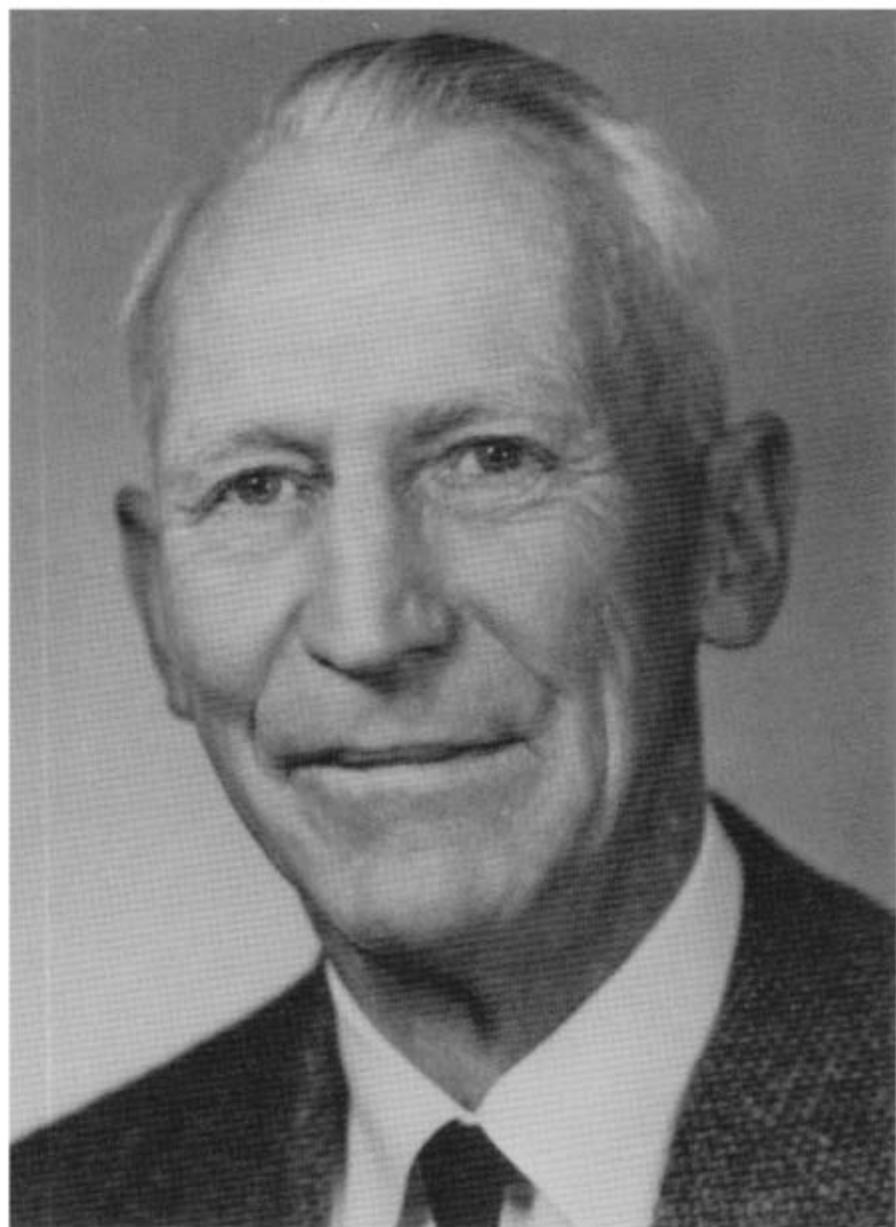
---

*A Biographical Memoir by*  
THOMAS B. NOLAN

*Any opinions expressed in this memoir are those of the author(s)  
and do not necessarily reflect the views of the  
National Academy of Sciences.*

*Biographical Memoir*

COPYRIGHT 1987  
NATIONAL ACADEMY OF SCIENCES  
WASHINGTON D.C.



*James Gillely*

# JAMES GILLULY

*June 24, 1896–December 29, 1980*

BY THOMAS B. NOLAN

AARON WATERS, in a “portrait” published more than ten years before James Gilluly’s death, characterized him as a “pioneer of modern geological ideas.”<sup>1</sup> The independence of thought implied by this characterization came naturally; both Gilluly’s father’s and mother’s grandparents had immigrated to the United States as rebels against repressive or unpopular regimes.

Gilluly was born in Seattle, Washington, June 24, 1896, the son of Charles Elijah Gilluly and Louisa Elizabeth [Briegel] Gilluly. Charles Gilluly’s grandfather had been a disciple of Robert Emmett and had left County Galway in Ireland in 1793; as Gilluly expressed it, his great-grandfather was “luckier than Robert, who was hanged.” Successive moves from New York State to Michigan and to Kansas led the family to the State of Washington in about 1890. Louisa Gilluly was descended from a German emigré family that escaped from Wurtemberg as a result of an abortive attempt to set up a republic in 1830. The family settled in East Saint Louis, where Louisa was taught in German until she went to high school. Her family moved to the Kittitas Valley in Washington in 1890.

<sup>1</sup> Aaron C. Waters, “Portrait of a Scientist: James Gilluly, Pioneer of Modern Geological Ideas,” *Earth Science Reviews/Atlas*, 5(1969):A19–A27.

Much of Gilluly's early life was spent in Seattle, with brief intervals in British Columbia, when his father was employed there, and on his mother's family ranch in eastern Washington. Even early in life he was a voracious reader, and in both grammar and high school he was fortunate in having excellent teachers who recognized and encouraged his capacities (he regularly enrolled in courses for extra credit). His high school career was marked by his selection as valedictorian of his class; in addition, he was captain of the football team, editor of the school class book, and chairman of the junior prom.

Gilluly's mother died during his last year in high school, and he lived with his father in Calgary, Alberta. The outbreak of World War I brought him back to the States, where he lived on his uncle's farm until he entered the University of Washington in the fall of 1915. His university career, however, was interrupted from time to time, partly by the necessity of meeting his living expenses and partly by enlistment in the Navy when the United States entered the war. During this period, Gilluly worked in the mines at Butte, Montana, on surveying parties, in the steelmills near Spokane, and as a stevedore on the Seattle docks, experiences that made him, in spite of his relatively small stature, an effective end on the Washington football team. (He also was a member of the basketball team and manager of the track team.) In addition, he was active in fraternity affairs, managing the house as well as participating in the social life.

At the end of the war, Gilluly was acting as instructor of newly enlisted sailors as a noncommissioned petty officer. He received a commission as ensign at the cessation of hostilities.

Throughout this unusually busy period, Gilluly continued his voracious reading in an amazingly wide range of subjects. This was in addition to the course work that marked successive majors in civil and mechanical engineering, business eco-

nomics, and, finally, geology. This last shift was made in his senior year, at least in part because of the influence of a fraternity brother who later became a distinguished petroleum executive.

Gilluly's initial venture into geology after graduation from the University in 1921 was, to a degree, an unhappy one and was followed by an equally unsatisfying experience in insurance. He had, however, taken a civil service examination for junior geologist while a senior in college, and in the spring of 1922 he was offered a part-time assignment with the U.S. Geological Survey in Washington, D.C.

Here he began many lifelong associations and friendships. With M. N. Bramlette and W. W. Rubey, he enrolled in part-time graduate studies at Johns Hopkins University. The next year, again with Rubey and Bramlette, he continued graduate work at Yale University. Here he made further friendships, both with fellow students (W. H. Bradley, G. G. Simpson, and others) and with a faculty that included Adolph Knopf, Charles Schuchert, Chester Longwell, and H. E. Gregory, each of whom influenced him significantly.

Following completion of his graduate work, he was given a series of field assignments with the Geological Survey. His first independent project was to investigate the geology of part of the North Slope of Alaska—an area that was beginning to be of interest for its petroleum potential. It was a strenuous and trying introduction to Geological Survey fieldwork in a harsh and unknown environment. Gilluly, after arrival at Point Barrow by boat from Seattle, started out with canoes and two young Eskimo assistants along the Arctic to map one of the larger rivers flowing northward into the Arctic Ocean. The North Slope of Alaska here is flat and featureless; with the young Eskimos, who were unfamiliar with the area, the party entered the Topogoruk River, rather than the larger Ikpikpuk, which had been the objective of the pro-

gram. This expedition up the “wrong river” was duly noted at the next annual performance of the Survey Pick and Hammer Club!

Successive field assignments to eastern Colorado, the San Rafael Swell in Utah, the Oquirrh Range in Utah, the Adirondacks in New York, the Canal Zone in Panama, the Baker area in Oregon, and the Ajo and Tombstone districts in Arizona provided Gilluly with a broad background of experience in widely different geologic terranes that supplemented his voracious reading.

The field assignments resulted not only in a series of Survey reports of high quality but also by-product papers on particular phases of geology that were significant contributions to geologic literature. A further broadening of Gilluly's experience resulted from a Survey-assisted journey to Europe in 1931, primarily for a period of study with Bruno Sander in Innsbruck of the new field of petrofabrics. Gilluly broadened the trip to include a tour of eastern Europe, the first of several trips that greatly increased his familiarity with global geologic problems.

An offer to join the faculty of the University of California at Los Angeles—at nearly double his Survey salary—was finally accepted by Gilluly, and he moved to Los Angeles in 1940, although he continued his association with the Survey.

The outbreak of World War II, however, soon interrupted his university career, and Gilluly resumed full-time Survey work, initially on projects designed to alleviate the shortage in the so-called strategic minerals. In the early summer of 1944, when the mineral supply was to a considerable degree resolved, he transferred to the Survey's Military Geology Unit, a group of specialists set up to assist the Corps of Engineers in the planning for the Pacific Campaign. The unit prepared reports on such matters as water supply, air-strip locations, appropriate landing beaches, and the like. These

activities, characterized as "terrain intelligence," proved to be extremely useful not only to the Corps but to the other branches of the military as well. Gilluly was first assigned to work with the military planning group in Australia, and later New Guinea, and was instrumental in the preparations for the invasion of the Philippines. He landed with the troops on Leyte after his group had recommended a landing area that proved to be far superior to the one originally selected. Similarly, a superior landing field for the airforce planes was proposed on the adjoining island of Samar, rather than one that had been planned for Leyte.

With the completion of his activities in the Philippines, Gilluly returned to the States and resumed his teaching at UCLA in the spring semester of 1945. He was a stimulating instructor, although a demanding one, and inspired great loyalty in those students who responded to his challenges, many of whom achieved their own share of distinction.

He became, however, increasingly intolerant of the machinery of university administration through service on the myriad committees that play a necessary and important role in the management of a major university. This dissatisfaction reached a climax in the McCarthy era, when the University of California was required to insist on a loyalty oath sworn annually by the faculty members. Rather than acquiesce in what he regarded as an intolerable personal and professional insult, Gilluly resigned his professorship and returned to full-time service with the Geological Survey in 1950.

The period from 1945 until 1950 marked a turning point in Gilluly's activities, and to some extent in his professional interests. Prior to his return to UCLA, he had been primarily a field geologist, and his major publications emphasized the areal geology of the regions that he studied, though by no means were more general problems neglected.

Now, however, his teachings required emphasis on the

broad aspects of geology. He, together with A. O. Woodford and Aaron Waters, was persuaded by William Freeman to prepare a textbook of geology. The authors agreed among themselves that the book would "concentrate on the analysis of processes that are at work upon and within the earth," rather than present a category of descriptive facts and terms.

*Principles of Geology* was finally published in 1951. It had been finely honed through the mutual reviewing and critical reading of the three authors, and it was accepted by many universities as "the" geology text. It went through several editions, the last one prepared by Gilluly alone.

Gilluly's return to the Survey initially permitted him to resume the geologic fieldwork he so enjoyed, and in which he excelled. A detailed study of a large and geologically complex area in central Nevada was especially productive. Nevertheless, other responsibilities in the Survey and the National Research Council took an increasing proportion of his time and energy.

After a minor heart attack during his service as chairman of the Division of Earth Sciences of the National Research Council, and a minor accident during some renewed fieldwork in Nevada, he reluctantly gave up rigorous fieldwork and divided his time between extensive reading, in preparation for revision of the *Principles*, and travel over much of the globe in company with his wife, Enid. In these travels he was widely accepted as a major figure in geology and was given great assistance in his visits to areas of geological significance.

Although the last few years of Gilluly's life were marked by several illnesses and hospitalizations, these did not prevent the continuation of his quest for new experiences and new ideas. His last trip, however, was a personal and sentimental one, to the scene of the 1898 Klondike gold rush, particularly to the vicinity of Chilkoot Pass, where his father had nearly lost his life at the hands of the infamous "Soapy" Smith gang. The end came on December 29, 1980, after a brief illness.

Gilluly's impact on the whole field of North American geology—through his textbook and teaching, his numerous papers, and especially his personality and human relationships—has probably been as great as any of his contemporaries. He was a familiar and highly regarded participant in all the geological gatherings he attended, and he never tired of his discussions (in which his beliefs were always vigorously presented) with geologists of all ages and backgrounds.

Gilluly's early papers, which mainly related to the field assignments he carried out for the Geological Survey, not only recorded the results of his fieldwork but also, prophetically, concerned topics and generalizations that were later elaborated into thoughtful and comprehensive papers of widespread application. His early assignment to report on the geology and ore deposits of eastern Oregon, for example, resulted in the preparation of papers on the "replacement origin" of the albite granite in the area and the water content of magmas. These papers were followed some years later by a *Memoir of the Geological Society of America*, the "Origin of Granite." Gilluly served as chairman of the group of authors, as well as a major contributor.

Discussion of the plutonic granite rocks was again a major theme in the William Smith lecture to the Geological Society of London. The lecture encompassed another major interest initiated by the observations and conclusions reached during his earlier geologic fieldwork in the western United States concerning the nature and causes of the geologic structures that he mapped. This interest became a recurrent theme, and may be seen in the series of later papers concerning the distribution of mountain building in geologic time; volcanism, tectonism, and plutonism in the western United States; orogeny and geochronology; and crustal deformation in the western United States, among others. A major conclusion that he reached, and vigorously defended, was that orogeny was, in contrast to the widely accepted theory of "periodic dias-

trophism," in progress throughout much of geologic time.

The titles in the appended bibliography epitomize the scope of Gilluly's geologic contributions; they are also a measure of the influence he exerted on geologic thought, both here and abroad. The contents of these papers reflect the tremendous range of Gilluly's reading. Less obviously, though probably in his opinion more importantly, his conclusions are firmly based on his recognition of the necessity for a thorough knowledge of the evidence provided by field observations. Finally, his papers are characterized by an independence of thought that was not influenced by popular or traditional concepts. His extensive reading, his emphasis on fieldwork, and his independence of thought seem to have been a natural response to the events that characterized his life, from his childhood days to his maturity as a recognized scholar. An important element in his response to these events was the ideal relationship he enjoyed with his wife, Enid Frazier Gilluly, over their married life of more than fifty years.

J. F. Smith<sup>2</sup> has made the following summary of the many honors that came to Gilluly during his lifetime, which, as he observes, were many and well deserved:

He was the Faculty Research Lecturer at UCLA in 1948, Bownocker Lecturer at Ohio State University in 1951, and the 17th William Smith Lecturer at the Geological Society of London in 1962 (published in 1963). He received the Penrose Medal, Geological Society of America, in 1958; the Distinguished Service Medal, the highest award of the U.S. Department of Interior, in 1959; the Walter Bucher Medal, American Geophysical Union, in 1969; and an honorary Doctorate of Science from Princeton University in 1959. The University of Washington, his undergraduate University, named him *Alumnus Summa Laude Dignatus* in 1963, a highly prestigious award in that the University bestows it upon only one alumnus each year. He was a member of the National Academy of Sciences, the American Academy of Arts and Sciences, and an Honorary Member of the Geolog-

<sup>2</sup>J. Fred Smith, Jr., "Memorial to James Gilluly," *Geological Society of America Memoirs* (1982).

ical Society of London. In 1962, he served as Chairman, Division of Earth Sciences of the National Research Council. Jim also served on the U.S. National Committee on Geology and the Upper Mantle Committee of the International Union of Geodesy and Geophysics, and was a member of many professional societies. He became a Fellow of the Geological Society of America in 1927, was Vice-President in 1947, and was President in 1948.

Smith also has provided a fitting tribute in the memorial he prepared for the Geological Society of America:

With the death of James Gilluly on December 29, 1980, at age 84, the geologic profession lost a powerful and imaginative protagonist whose contributions to science, and to the development of scientists, spanned well over half a century. Although Jim qualified as a specialist in many different disciplines at various stages in his career, and especially as a structural geologist, he was truly and proudly a general geologist. His enormous knowledge of scientific literature and his prodigious memory served him well in dealing productively with an exceptionally broad spectrum of geologic researches. A positive man who was always ready to accept or fling the gauntlet on subjects from geology to politics, Jim expressed his convictions strongly and with a quick wit. He was also a warm human being, a great believer in the rights of the individual, and a defender of the less fortunate. His knowledge was catholic, and he could recite an appropriate poem or a song from Gilbert and Sullivan as readily as he could recall an obscure scientific reference.

Finally, the citation by the University Orator at the time of Gilluly's receipt of the honorary degree of Doctor of Science from Princeton University is an appraisal that many of us regard as supremely fitting: "Dean of American field geologists, inimitable investigator of the inanimate, he is the spiritual descendant of the classical giant Antaeus, who was never so strong as when his feet stood on Terra Firma. Rock-bound coasts hold no terrors for him—he analyzes them; he lifts up his eyes unto the hills—and explains their formation; his brilliant record places him in the forefront of the most impregnable of professions, for it is founded upon rock."

## SELECTED BIBLIOGRAPHY

1923

With K. C. Heald. Stratigraphy of the Eldorado oil field, Arkansas, as determined by drill cuttings. U.S. Geol. Surv. Bull., 736:241–48.

1925

With Sidney Page and W. T. Foran. A reconnaissance of the Point Barrow region, Alaska. U.S. Geol. Surv. Bull., 772:33.

1927

Analcite diabase and related alkaline syenite from Utah. Am. J. Sci., 5th ser., 14:199–211.

1928

With J. B. Reeside, Jr. Sedimentary rocks of the San Rafael Swell and some adjacent areas in eastern Utah. U.S. Geol. Surv. Prof. Pap., 150:61–110.

With K. F. Mather and R. G. Lusk. Geology and oil and gas prospects of northeastern Colorado. U.S. Geol. Surv. Bull., 796:65–124.

1929

Geology and oil and gas prospects of part of the San Rafael Swell, Utah. U.S. Geol. Surv. Bull., 806:69–103.

Possible desert-basin integration in Utah. J. Geol., 37:672–82.

1931

Copper deposits near Keating, Oregon. U.S. Geol. Surv. Bull., 830:32.

1932

Geology and ore deposits of the Stockton and Fairfield quadrangles, Utah. U.S. Geol. Surv. Prof. Pap., 173:171 pp.

1933

Replacement origin of the albite granite near Sparta, Oregon. U.S. Geol. Surv. Prof. Pap., 175:65–81.

With J. C. Reed and C. F. Park, Jr. Some mining districts of eastern Oregon. U.S. Geol. Surv. Bull., 846:140 pp.

With J. P. Connolly and C. P. Ross. Mesothermal gold deposits: Ore deposits of the western States (Lindgren volume). Am. Inst. Min. Metall. Eng.:573-77.

1934

Mineral orientation in some rocks of the Shuswap terrane as a clue to their metamorphism. Am. J. Sci., 5th ser., 28(165):182-201.

1935

Keratophyres of eastern Oregon and the spilite problem. Am. J. Sci., 5th ser., 29(171):225-52; 336-52.

1937

The water content of magmas. Am. J. Sci., 5th ser., 33(198):430-41.

Geology and mineral resources of the Baker quadrangle, Oregon. U.S. Geol. Surv. Bull., 879:119 pp.

1942

The mineralization of the Ajo copper district, Arizona. Econ. Geol., 37:257-309.

1945

Emplacement of the Uncle Sam Porphyry, Tombstone, Arizona. Am. J. Sci., 243:643-66.

1946

The Ajo mining district, Arizona. U.S. Geol. Surv. Prof. Pap., 209:112 pp.

1948

(Chairman) Origin of granite: Geol. Soc. Am. Mem., 28:139 pp.

1949

With U. S. Grant. Subsidence in the Long Beach Harbor area, California. Geol. Soc. Am. Bull., 60:461-529.

Distribution of mountain building in geologic time (address of the retiring President). Geol. Soc. Am. Bull., 60:561-90.

1950

Distribution of mountain building in geologic time; a reply of discussion by H. Stille. *Geol. Rundschau*, 38(2):103-7.

1951

With A. C. Waters and A. O. Woodford. *Principles of Geology*. San Francisco: W. H. Freeman. 631 pp., illus.

With J. R. Cooper and J. S. Williams. Late Paleozoic stratigraphy of central Cochise County, Arizona. U.S. Geol. Surv. Prof. Pap., 266:49 pp.

1954

Further light on the Roberts Thrust, north-central Nevada. *Science*, 37:672-82.

1955

Geologic contrasts between continents and ocean basins. In: *Crust of the Earth—A Symposium*, ed. A. Poldervaart, *Geol. Soc. Am. Spec. Pap.*, 62:7-18.

1956

With A. R. Palmer, J. S. Williams, and J. B. Reeside, Jr. General geology of central Cochise County, Arizona. U.S. Geol. Surv. Prof. Pap., 281:169 pp.

1958

With R. J. Roberts, P. E. Hotz, and H. S. Ferguson. Paleozoic rocks of north-central Nevada. *Am. Assoc. Petrol. Geol. Bull.*, 42:2813-57.

1963

The tectonic evolution of the western United States—17th William Smith Lecture. *Geol. Soc. London, Q. J.*, 119:133-74.

The scientific philosophy of G. K. Gilbert. In: *The Fabric of Geology*, ed. C. C. Albritton, Jr., pp. 218-24. Reading, Mass.: Addison-Wesley.

1964

Atlantic sediments, erosion rates, and the evolution of the continental shelf—some speculations. *Geol. Soc. Am. Bull.*, 75:483-92.

1965

Volcanism, tectonism, and plutonism in the western United States. Geol. Soc. Am. Spec. Pap., 80:69 pp.

With Olcott Gates. Tectonic and igneous geology of the northern Shoshone Range, Nevada. U.S. Geol. Surv. Prof. Pap., 465:151 pp.

With Harold Marsursky. Geology of the Cortez quadrangle, Nevada. U.S. Geol. Surv. Bull., 1175:117 pp.

1966

Orogeny and geochronology. Am. J. Sci., 264:97-111.

1967

Chronology of tectonic movements in the western United States. In: *Symposium on the Chronology of Tectonic Movements in the United States*, Am. J. Sci., 265:306-31.

Geologic map of the Winnemucca quadrangle, Pershing and Humboldt Counties, Nevada. U.S. Geol. Surv. Geol. Quad. Map GQ-656, scale 1:62,500, sections.

1968

The role of geological concepts in man's intellectual development. In: *Limitations of the Earth, a Compelling Focus for Geology*, Proc. Texas Q., 11(2):11-23.

Geological perspective and the completeness of the geologic record. Geol. Soc. Am. Bull., 80:2303-11.

Oceanic sediment volumes and continental drift. Science, 166:992-94.

1970

Crustal deformation in the western United States. In: *The Megatectonics of Continents and Ocean Basins*, ed. Helgi Johnson and B. L. Smith, pp. 47-73. New Brunswick, N.J.: Rutgers University Press.

With J. C. Reed, Jr., and W. M. Cady. Sedimentary volumes and their significance. Geol. Soc. Am. Bull., 81:353-75.

1971

Plate tectonics and magmatic evolution. Geol. Soc. Am. Bull., 82:2383-96.

1972

Tectonics involved in the evolution of mountain ranges. In: *The Nature of the Solid Earth*, pp. 406–39. New York: McGraw-Hill.

1973

Steady plate motion and episodic orogeny and magmatism. *Geol. Soc. Am. Bull.*, 84:499–513.

Steady plate motion and episodic orogeny and magmatism—A correction. *Geol. Soc. Am. Bull.*, 84:3721–22.

1977

American geology since 1910—A personal appraisal. *Annu. Rev. Earth Planet. Sci.*, 5:1–12.

1980

Milton Nunn Bramlette. In: *Biographical Memoirs of the National Academy of Sciences*, vol. 52, pp. 81–92. Washington, D.C.: National Academy Press.