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WENDELL PHILLIPS WOODRING

1891—1983

A Biographical Memoir by

ELLEN J. MOORE

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WENDELL PHILLIPS WOODRING worked for the U.S. Geological Survey (USGS) almost continuously for over forty-five years. His first job with the USGS was as a field assistant (or roustabout, as he called it) during the summer of 1912. This may have been the time he set his party chief adrift in a boat on a fast-moving river with the oars aboard but without the oarlocks in place. In spite of this youthful blunder, he was given a second chance, and he became an internationally recognized authority on Tertiary fossils of the Caribbean, Central America, and California.

Woodring's recognition of time-equivalent dissimilar lithologic facies in the California Coast Range brought order to a near-chaotic complexity, and it is the basis for all subsequent studies in that area. His painstaking and probing studies of Cenozoic molluscan faunas in the Caribbean and the adjacent eastern Pacific led to his estimate of almost precisely at the Pliocene-Pleistocene boundary for the completion of the Panamanian sea barrier and land bridge. This estimate also established the time of initiation of the great Pleistocene mammal migrations between North and South America.

Wendell Woodring was born June 13, 1891, in Reading, Pennsylvania, and was named for the abolitionist Wendell Phillips, whom his father admired. His great-great-great-grandfather Samuel Wotring changed his name to Woodring when he landed in Philadelphia in 1749. The family name originally was Vautrin in Lorraine, France, but was teutonized to Wotring after the Massacre of St. Bartholomew Day, when the family fled to Alsace, then part of Germany. His father, James Daniel Woodring, a minister in the Evangelical (now United Methodist) Church, was installed as president of Albright College, the educational institute of the church. Woodring's mother, Margaret Kurtz Hurst, was of German-Swiss ancestry. His father died in 1908, leaving his mother the task of supporting their six children on meager resources. Woodring graduated from Albright College in 1910 at the age of nineteen and taught high school science classes at St. James, Minnesota.

In 1912 he went to the Department of Geology at Johns Hopkins University as a graduate student. Although Woodring felt he was "woefully unprepared," the chairman of the department, William Bullock Clark, merely recommended that Woodring take undergraduate courses in geology and mineralogy during his first year. This he did under Professor Charles Schwartz, whom he found inspiring. He was also influenced by Professor Harry Fielding Reid, who had just published his elastic-rebound theory of earthquakes, and by Edward Berry, professor of paleontology. Woodring was awarded his Ph.D. in 1916.

Woodring worked for the USGS at the same time he pursued his doctorate at Hopkins. His dissertation dealt with Miocene marine bivalves and scaphopods from Jamaica. Under an informal agreement between the U.S. Geological Survey and the Carnegie Institution of Washington, he later expanded this work to include the gastropods. Pub-

lished as a two-volume set, it is modestly titled *Miocene Mollusks from Bowden, Jamaica.* But Woodring was not content only to describe the species and discuss their stratigraphic significance. He devoted a significant portion of the work to the origin and ecology of the fauna, setting a precedent in depth of inquiry.

Woodring was a leading contributor to systematic paleontology, which he called "old-fashioned paleontology." His series of Professional Paper chapters on "Geology and Paleontology of Canal Zone and Adjoining Parts Panama, a Contribution to the History of the Panama Land Bridge" (1957–82) stand as a testimony to his scholarly approach to the subject. But Woodring was no ivory-tower systematist. He was also a highly skilled field geologist who believed in covering foot by foot the terrain that he was mapping. Using Cenozoic marine mollusks as a guide to time-equivalent beds, he was able to separate and delineate lithologically similar strata, and his now classic maps have yet to show need of major revision. In fact, Ernst Cloos in presenting Woodring with the Geological Society of America's Penrose medal in 1950, said, "He is not a specialist—his interest and knowledge include the entire field of geology. He is a geologist's geologist."

In 1917 Woodring was hired as a geologist and paleontologist by Sinclair Oil Corporation for work in Costa Rica and Panama. Then, having volunteered for wartime military service, he served as second lieutenant in the 29th Engineers on the Marne River in France from 1918 to 1919. His battalion commander was Major Theodore Lyman, professor of physics at Harvard, whose name is immortalized in stellar spectroscopy as the discoverer of the Lyman line, and his regimental commander was Colonel Roger L. Alexander, professor of physics at Princeton.

After the war Woodring resumed work with the USGS,

where he briefly studied the Elk Hills Naval Petroleum Reserve, in the San Joaquin Valley of California. In 1920 he was designated geologist-in-charge of the Geological Survey of Haiti. This was done according to treaty terms imposed on the Haitian government in July 1915 by the United States government during occupation by the marines following a political crisis. He traveled over much of Haiti in pack trains of horses and mules mapping the geology, and returned to the United States in April 1922. He then was appointed paleontologist in the Tropical Oil Company to work in the Caribbean coastal part of Colombia.

Woodring became professor of invertebrate paleontology at the California Institute of Technology in 1927. During his teaching years, he became a close friend of Chester Stock, professor of vertebrate paleontology, of Ralph Reed, who sharpened his knowledge of the geology of California, and of his own student, diatom specialist Kenneth Lohman. During this time, much to his great amusement in later years, he and his wife employed Linus Pauling, later two-time Nobel laureate, as an occasional baby sitter for his two daughters.

He returned to the Geological Survey in 1930, saying that three years of teaching were enough, and was assigned to map the Kettleman Hills, California. The field work was done in 1930–32. His careful mapping in the Kettleman Hills laid the groundwork for the stratigraphic classification and nomenclature of the California marine Tertiary. It contributed significantly to later interpretation of the Cenozoic geologic history of the Coast Range and to our understanding of deformation related to the San Andreas fault. Among the most valuable results of the Kettleman Hills study were the descriptions of outcropping Tertiary formations from Coalinga to Taft and how these formations relate to subsurface units, particularly to those oil-

bearing units informally named by drillers. The Kettleman Hills Oil Field became one of California's most productive.

In the summer of 1934, in association with Milton (Bram) Bramlette, Woodring began work on the Palos Verdes Hills, an uplifted peninsular block on the southwestern border of the Los Angeles basin. He has said that this was the most satisfying of his field experiences, partly because he so admired Bramlette, whom he considered an exceptionally skilled field geologist, but mostly because so many aspects of geology were involved and because the problems were so challenging. The Palos Verdes Hills work emphasized data that might aid in the study of the subsurface of the Los Angeles basin and the discovery of oil. But the Palos Verdes Hills paper went out of print quickly because it was in great demand by engineering geologists working to save structures threatened by the serious landslides around the seaward slopes of the peninsula. Woodring himself was amused by this development and dubbed the report a "best-seller."

From 1938 to 1940, again in collaboration with Bramlette, Woodring mapped the geology of the Santa Maria district in coastal southern California. Topographic maps of suitable scale and accuracy were not available, so aerial photographs were used for field work. The geologic maps were published on a base of mosaics of these photographs and are the first colored maps published on such a base by the USGS. In this paper, as in two others dealing with the Cenozoic stratigraphy of southern California, he presented the systematic paleontology in narrative rather than formal style, because the primary emphasis was on the geology and the relationship of the molluscan and foraminiferal faunas to the stratigraphy. These papers today remain the standard reference on paleontology, geologic names, and lithostratigraphy for geologists who work on the giant oil

fields in the Santa Maria, San Joaquin, and Los Angeles basins, both onshore and offshore.

From 1941 until the end of World War II, Woodring was engaged in government oil investigations in California and was headquartered at the University of California at Los Angeles. He then returned to Washington, D.C., and the main office of the Paleontology and Stratigraphy Branch of the USGS, housed in the Smithsonian Institution's National Museum of Natural History. One of his most memorable experiences during this time was mapping the geology of Barro Colorado Island, Panama, which he said was "like working in an unfenced zoological park and botanical garden." This island now holds the headquarters of the Smithsonian Tropical Research Institute.

In the late 1940s, Woodring directed his attention to continental tropical America and began his monumental work on the geology and fossil mollusks of the Canal Zone and adjoining parts of Panama, something he had wanted to do since his student days. He began field work in the Republic of Panama in 1947 and made his tenth and last visit there in 1977 at the age of eighty-five. The first chapter of the Professional Paper series based on this work was published in 1957, and the sixth and last chapter was published in 1982. During the 1960s and into the 1970s, he devoted most of his time to this project, knowing it would be his last contribution to Tertiary molluscan paleontology. This olympian work describes and records 964 species and subspecies of mollusks in nine marine formations ranging in age from Eocene to Pliocene. He planned the formal systematic paleontology to be a basic foundation for all subsequent work in tropical America, as indeed it is and will be for many years to come. Of particular interest to him were the zoogeographic relations of the Panamanian faunas, which showed that a strait separated North and South

America during most of Tertiary time. He concluded that the mammalian faunal interchange across the Isthmus of Panama began near the boundary between the Pliocene and Pleistocene and was at its zenith during the early Pleistocene. When he spoke of the animals crossing this land bridge for the first time, his voice would change to express awe, and his eyes would light up the with wonderment of the scene.

In addition to these weighty tomes, Woodring published many shorter papers of superlative quality. Preston Cloud (1983) particularly admired one such paper and said:

> It was a brief two-page note (1960), musing pointedly on the significance of the pelecypod *Astarte*, found in modern subarctic waters and also in the subtropical Eocene London Clay Sea—an example, as he put it, of paleoecologic dissonance. A mere abstract, questioning the basic assumption underlying paleoecology.

In 1961, to honor his work on the occasion of his retirement, Preston Cloud, then with the USGS, and Philip Abelson, then with the Geophysical Laboratory, Carnegie Institution of Washington, organized the "Woodring Conference on Major Biologic Innovations and the Geologic Record" attended by his colleagues and friends from the United States, France, Belgium, Canada, and England.

Woodring's impact on the U.S. Geological Survey was unique. Refusing to accept administrative duties himself, he served as counselor to many administrators. He was an active participant in and contributor to two of the basic ruling guides of geology and paleontology: the Code of Stratigraphic Nomenclature and the International Zoologic Code. Serving as a role model for a host of younger paleontologists, his influence through the structure of his papers had a profound effect on others who strove to emulate him. In addition to being scholarly, his papers are of high literary quality and, rather than measured by quantity of printed pages, every page counts. His advice to one

young author was, "Though nobody reads paleontologic papers for delectation or amusement, the reading should be as painless as possible."

Woodring officially retired from the USGS in 1961, because at that time no one could be employed by the Survey past the age of seventy. But he continued his work at the National Museum, as a Smithsonian Research Associate, occupying the same office as before. Woodring retired more fully in 1979 and went to Santa Barbara, California, where he lived in a retirement home, used the library at the University of California, Santa Barbara, and interacted with members of the Department of Geological Sciences. He died in Santa Barbara on January 29, 1983.

During the 1930s and '40s most of Woodring's colleagues at the National Museum were his age or older, and all were world-renowned specialists in their fields. Questions in any area of the natural sciences could be answered by a short walk down the hall. These scientists occupied large offices furnished with single light bulbs hanging from the ceilings and with microscopes of ancient vintage basically valuable today only as antiques. Mostly, his colleagues were male, and they wore somber suits to work with white shirts and ties. Some placed elastic bands on their shirt sleeves to keep them out of the way and wore green visors to protect their eyes from the glare of the naked light bulbs. Originally, the offices in the museum were all on the third floor, and one wit, a renowned scientist himself, said that the third floor housed the most interesting exhibits.

Woodring certainly shared in this glory and eccentricity, although he eschewed the eyeshades and shirt garters. He always walked erect, and his presence was austere. Socializing took place only during lunch or during one of his two precisely scheduled fifteen-minute coffee breaks. He was meticulous in every way, and his office was always

impeccably neat. At the close of the day, he cleared his desk and neatly stacked and covered the wooden half-trays of fossils. He wrote his papers in longhand on pads of blue-lined paper and sent the sheets directly to the typist, usually without a need to add or change a single word.

As a young man at the National Museum, Woodring had held William Healey Dall in awe, and said later, in a memorial to Dall (1958,3), that "to a novice he was a fabulous tradition rather than a man," and so Woodring himself grew to be regarded. His appearance and reputation kept many people at bay, yet he could be most kind and compassionate, even forgiving gross accidental errors if the appropriate apology was forthcoming. He never expected more of others than he asked of himself. But he was intolerant of imprecision, and it was hard to meet his level of precision and thoroughness. Woodring set high scholarly goals, and he loved to be challenged intellectually and to argue with admired colleagues, but few had the fortitude to rise up and disagree with him. Still, he disliked obsequiousness and would become angry when his ideas were accepted without thought, simply because of his reputation.

When Preston Cloud became Woodring's chief in the late 1940s he brought the branch into the 20th century with fluorescent lights and new microscopes. He also started hiring young Ph.D.'s to train under the old timers, and obtained budgets sufficient to support field work. The changes were stunning, and many in the group old enough to have fathered Cloud took umbrage. But not Woodring. He supported Cloud and his innovations, and the two became close friends. Cloud reciprocated by challenging him at every turn, and Woodring was delighted. On special occasions during a two- or three-martini lunch, the glasses would bounce on the table as the two pounded away, arguing on the cutting edge of geology. Those, including the

new crop of young scientists who worked with Woodring and saw beneath the tradition and dignity, cherished Woodring as a colleague and friend who was deeply caring and had a delightful sense of humor.

Woodring was awarded membership in the National Academy of Sciences in 1946, served as chairman of the Geology Section and coordinator to the Biology Section, and in 1950 organized an Academy conference on paleoecology and biogeochemistry. From this conference emerged new interdisciplinary efforts related to the biosphere, atmosphere, and crustal evolution within the larger Earth history. He was president of the Paleontological Society in 1948 and received the Penrose medal of the Geological Society of America in 1949 and an honorary Doctor of Science from Albright College in 1952. He was president of the Geological Society of America in 1953 and was elected to membership in the American Philosophical Society in the same year. He received the Distinguished Service Award and Gold Medal of the U.S. Department of the Interior in 1959. In 1967 Woodring received the Thompson Medal of the National Academy of Sciences, and in 1971 he was honored by the President of Costa Rica on behalf of Central American geologists. In 1977 he received the medal of the Paleontological Society.

In 1918 he married Josephine Jamison, who died in 1964. In 1965 he married Merle Crisler Foshag, who died in 1977. His daughter Jane died in 1954. At the time of his death he was survived by his daughter, Judy Armagast, three grandchildren—David Woodring Armagast, Marilyn Armagast Martorano, and Susan Jane Armagast (now Susan A. Moison, M.D.)—and two sisters, Margaret Brillhart and Mary Hangen.

A final tribute is the establishment by his daughter Judy of the W. P. Woodring Memorial Fund, for aid to graduate students in the Department of Geological Sciences at the

University of California, Santa Barbara. A legacy which Woodring himself bestowed was his donation of over 2,000 volumes and some eight boxes of reprints to the Escuela Centroamericana de la Universidad de Costa Rico to show his admiration and respect for the people.

FOR THIS MEMORIAL, I drew on biographic data prepared by Woodring for the National Academy of Sciences and furnished to me by the Office of the Home Secretary, as well as on memorials previously published by Preston Cloud (American Philosophical Society, 1983) and myself (Geological Society of America, 1984). Also used were the Penrose medal presentation by Ernst Cloos (1950), the Paleontological Society medal presentation by Preston Cloud (1978), and personal data from Woodring's daughter, Judy Armagast. And finally included are my own recollections of working with Woodring at the National Museum from 1951 to 1959, and information from correspondence that is now housed in the archives of the Smithsonian Institution.

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