

Memorial to Karl M. Waage

1915–1999

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Karl M. Waage, professor emeritus at Yale University and curator emeritus at Yale's Peabody Museum of Natural History, died October 18, 1999, in Branford, Connecticut. Karl Mensch Waage was born December 15, 1915, in Philadelphia, Pennsylvania. He descended from a long line of ministers and always said that the religious line ended with him. His father, a physician, died at an early age, and Karl was raised by his mother. Influenced early on by an amateur rock and mineral collector, he entered Princeton in 1935 with an interest in geology. At Princeton, Karl met Erling Dorf, the renowned paleobotanist working on the floras of the Late Cretaceous and early Tertiary. Karl joined him on field trips to the northern Great Plains, exploring the region during the dust bowl conditions of the late 1930s. During one of these visits, Karl glimpsed the fossil riches of the Upper Cretaceous Fox Hills Formation for the first time. His senior thesis dealt with the stratigraphy of this formation in the Lance Creek area, Wyoming.



Karl began working on his Ph.D. at Yale University in 1939, but after a year he returned to Princeton, where he earned his M.A. degree in 1942 and his Ph.D. in 1946. There he met and married Elizabeth King in 1942. During these years, Karl also worked for the U.S. Geological Survey in Alabama and Maryland under the direction of Preston Cloud. He investigated deposits of bauxite and high-alumina clays—minerals important for the war effort. He extended his studies to refractory clays of the Colorado Front Range, the subject on which he wrote his Ph.D. thesis.

Karl was hired in 1946 as an instructor in the geology department at Yale University and assistant curator of invertebrate paleontology at the Peabody Museum. For the next 15 years or so, he also worked during the summers for the USGS. He published his studies on the sedimentary deposits of Maryland, Alabama, and the Colorado Front Range. He investigated the Lower Cretaceous Dakota Group in Colorado, clarifying its relationship to the underlying Morrison Formation and drawing attention to the importance of regional unconformities that represented significant time hiatuses. He then broadened his study to include the Inya Kara Group in the Black Hills, revising its stratigraphy and providing an interpretation of its depositional environment.

In the mid-1950s, Karl refocused his attention on the Fox Hills Formation in its type area in South Dakota. His enthusiasm for this subject was to mark his research for the rest of his career. Summers were spent locating outcrops, measuring sections, and collecting fossils. During these summers, Karl introduced dozens of Yale students to the stratigraphy of the Fox Hills Formation and the attractions of sagebrush, badlands, and hard-to-break concretions. Karl was also accompanied at times by his sons and his colleagues, including Jost Wiedmann and Tove Birkelund.

Karl's field studies culminated in his 1968 monograph describing the facies relationships, lithologic units, and molluscan zonation of the Fox Hills Formation. He demonstrated that this formation represented a transition from the environment of a clastic barrier shelf through that of the shoreface of a barrier bar complex during the final retreat of the Late Cretaceous sea. This

work set a standard for paleoenvironmental studies at a time when such studies were first gaining prominence.

Karl and his students amassed a large and well-documented collection of Fox Hills fossils, a pride and joy of the Peabody Museum. Its highlight is undoubtedly the scaphitid ammonites, among the best-preserved and most beautiful fossils in the world. I enjoyed a long collaboration with Karl working on these scaphites, describing their systematics, life history, and distribution.

During his field work, Karl made Timber Lake, South Dakota, his base of operations. He became an annual summer visitor and a good friend of many of the townspeople and ranchers; in particular, he developed a close friendship with Helen Ross, postmistress of the town and indefatigable collector of Fox Hills fossils. In honor of his contributions to understanding the geology of the region, the Timber Lake and Area Historical Society awarded him an honorary lifetime membership.

In 1967, Karl became professor at Yale University and curator at the Peabody Museum. In 1977, he was named Alan M. Bateman Professor of Geology and Geophysics. He was director of graduate studies from 1968 to 1971 and chairman of the department from 1973 to 1976. He worked with Carl Dunbar in the 1950s to redesign the Invertebrate Hall in the museum, explaining the life history and evolution of these animals. He and Dunbar wrote a textbook on historical geology, continuing a tradition begun by Charles Schuchert. In addition, Karl oversaw a major renovation of Peabody's research collections and facilities in the early 1960s.

Karl was always interested in the welfare of the museum, where he had his laboratory and office, and became acting director in 1979 and director in 1980, serving until 1982. He recognized the unique role of a university museum and emphasized the importance of collections for original research. One of the memorable events during his tenure was the replacement of the head on O. C. Marsh's *Brontosaurus* skeleton, a media event that attracted national attention.

Over the years Karl taught courses in field geology, invertebrate paleontology, and stratigraphy. In his most popular course, Mesozoic Stratigraphy, he stressed the complexities surrounding the determination of systemic boundaries, the utility of biostratigraphy, and the important concept of facies and its application to Upper Cretaceous stratigraphy in the U.S. Western Interior. The course also gave him an opportunity to discuss the history of geologic exploration in the West, a subject close to his heart.

Perhaps Karl's greatest legacy was his mentorship of dozens of students, both undergraduate and graduate. His ready smile, sense of fair play, and sparkling brown eyes helped put students at ease. To many students and colleagues he was "Uncle Karl." Everyone will always remember the enjoyable dinners he and Betty hosted at their house in Hamden. His graduate students worked on a variety of subjects, and Karl always encouraged them to choose their own field of study. Although many of his students, influenced by Karl's own interest, specialized in the Cretaceous, all of them benefited from Karl's insights and knowledge.

Karl retired in 1986 but continued to work on the Fox Hills scaphites, producing several papers. Encouraged by his colleagues at Yale, he was also coauthor of a final manuscript on Holocene concretions from West Haven, Connecticut, a project he had begun 30 years earlier.

Karl is survived by his wife Elizabeth (Betty) King Waage of North Branford, Connecticut; his sons Jonathan King Waage of Rehoboth, Massachusetts, and Jeffrey King Waage of Windsor, England; and four grandchildren.

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