

Memorial to Fred B. Phleger

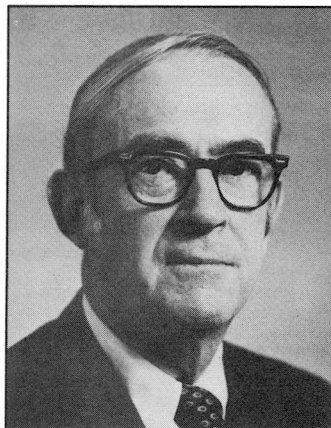
1909–1993

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Fred B. Phleger, a Fellow of the Geological Society of America, died peacefully on December 14, 1993, in Carlsbad, California, after an extended period of disability that he had endured with characteristic courage. He was professor emeritus at Scripps Institution of Oceanography (University of California, San Diego).

Phleger was a pioneer in the ecology and paleoecology of foraminiferan protists (both planktonic and benthic) and helped establish, in his 35 years at Scripps, the now thriving field of paleoceanography. For many years his work and that of his collaborator Frances Parker was at the very forefront of the field. His interests were broad, ranging from the deep-sea environment to shelf and lagoonal processes as reflected in foraminiferal distributions. Regarding pre-Recent studies, he was among the first to show that ice-age climatic fluctuations can be read from deep-sea sediments. Contributions of central importance are in the monograph on North Atlantic Foraminifera (1953), with Frances Parker and Jean Peirson, reporting work on cores raised by the Swedish Deep-Sea Expedition, and in several studies on Gulf of Mexico Foraminifera (in part with Frances Parker). His book on the subject of foraminiferal ecology (published in 1960) opened new avenues of research. Thanks to his well-known children's books (in part written with his wife Marjorie), Fred Phleger is quite likely one of the most widely read authors among micropaleontologists (along with Ernst Haeckel).



Fred B. Phleger was born in Kansas City on July 31, 1909, as the only child of Norabelle and Fred Phleger. His parents soon moved to California, and Fred, Jr. went to school at Los Angeles City Junior High School and Manual Arts High School, receiving his high school diploma in 1927. He entered the University of Southern California (Los Angeles) and majored in drama. While on stage, he greatly impressed a young woman named Marjorie Temple; they married in 1933. In time, they had a son Charles and a daughter Audrey Anne, who both excelled in academic and athletic pursuits.

At some point in his undergraduate studies, Fred decided to switch from the theater to something more solid. Having graduated with an A.B. from the University of Southern California, he soon found himself working for a master's degree at the California Institute of Technology, studying Ordovician fossils. He received his certificate in 1932. From California he migrated to the East Coast, to Harvard University, where he earned his Ph.D. in geology in 1936 with a dissertation on trilobites.

While at Harvard, Fred studied foraminifera with Joseph A. Cushman. He quickly realized the potential of foraminifera as environmental indicators, and that this potential had not been exploited. Also, he met Frances Parker, already an expert in foraminifera, who had been working with Cushman for some time. From then on, studies on foraminiferal ecology increasingly became the focus of his work, and collaboration with Frances Parker was to distinguish the most productive period of his career.

After completing his studies at Harvard, in 1937 Fred was granted a Sheldon Traveling Fellowship, which he used (along with some help from parents) to travel in Europe with Marjorie. He then joined the faculty of Amherst College as an instructor in paleontology, advancing to assistant professor in 1940 and to associate in 1949. While there, he developed a somewhat fleeting interest in vertebrate paleontology, especially Pleistocene cats. One of his duties as part of the war effort was to teach oceanography to future naval officers, at Amherst and Woods Hole. Thus, he acquired a broad knowledge of the field of oceanography. At the same time, he continued his studies on foraminifera, and with F. L. Parker soon published a GSA Memoir on foraminiferal distributions in the northwest Gulf of Mexico. During summertime he worked in collaboration with Henry Stetson at Woods Hole Oceanographic Institution, studying foraminiferal distributions in cores from the continental slope off the East Coast. His chief goal in this research was to relate environmental factors to patterns of foraminiferal distributions, a line of investigation that had as yet few proponents.

When the Swedish Deep-Sea Expedition, under the leadership of Hans Pettersson, set out to make a systematic survey of late Quaternary deep-sea sediments, Fred was asked to work up the foraminifera. He came on board for a short part of the cruise. Even before the end of the expedition, in 1948 he published a short paper on a core from the Caribbean. It already hints at the usefulness of foraminifera as indicators of Pleistocene climatic fluctuations and represents a first step toward the study of the ice-age wiggles which has since dominated marine Quaternary research.

In 1949 Phleger went to Scripps Institution of Oceanography as a visiting associate professor. He found La Jolla to his liking and, in 1951, permanently joined the SIO faculty. Frances Parker soon joined the research staff at Scripps, and the collaboration between her and Phleger continued within the newly founded Marine Foraminifera Laboratory. In 1953 they published, with Jean Peirson, the monograph on the Swedish cores that was to become an all-time classic on the use of foraminifera in research on paleoclimate and paleoceanography. Among the major contributions of this study are a greatly improved climate zonation for planktonic foraminifera, the first quantitative survey of deep-sea benthic foraminifera, important insights regarding the migration of climatic zones during the Pleistocene, and the effects of carbonate dissolution on the preservation of foraminifera.

Besides recognizing the paleoceanographic potential of deep-sea foraminifera, Fred employed the protistan remains in the unraveling of problems associated with redeposition processes. In 1950, "turbidites" was not yet a household word, but in the years that followed "turbidity currents" and associated processes of redeposition figured prominently in the discussions among sedimentologists. "Displaced" foraminifera, a concept introduced by M. Natland and early emphasized by Phleger, played an important role in the debates.

In the meantime, the petroleum industry had realized the importance of correct environmental reconstruction in bettering the odds of finding oil. The American Petroleum Institute, in its Project 51 (1951–1958), made research funds available for the study of modern environments of deposition in the Gulf of Mexico. In this project, Phleger worked with F. P. Shepard and Tj. H. van Andel and others to produce another classic of sedimentology-paleoceanography: "Recent Sediments, Northwest Gulf of Mexico."

After the end of Project 51, Fred was ready to summarize what was then known about the ecology of foraminifera, drawing extensively on his own intimate experience with deep-sea sediments and shallow marine processes, as well as on the researches of Frances Parker and on the studies by his early students, W. R. Walton, T. Uchio, and J. S. Bradshaw. The themes of his book *Ecology and Distribution of Foraminifera* (depth zonation, effects of environment on growth and distribution, planktonic foraminifera as water-mass indicators, and applications to

paleoceanography) have remained central to foraminiferal ecology. With this book Phleger set a milestone and outlined the essence of a new subdiscipline of geology and oceanography— foraminiferal paleoceanography. His later students, in particular A. Golik, A. Blackman, and W. H. Berger, were to build on this foundation.

In the years that followed, Fred continued to take an interest in the ecology of benthic foraminifers (with Jack Bradshaw, who did laboratory experiments) and in that of planktonic foraminifers (encouraging Berger to pursue planktonic studies). However, his chief concern became the processes in lagoons and marshes and their effects on foraminiferal distributions. He began with a systematic air reconnaissance of Mexican lagoons, with Gifford Ewing. Eventually these interests led to much field work, in various parts of the world, which Fred carried out with zest, Marjorie performing the role of assistant. Much of this type of work was done in Mexico, in collaboration with Augustín Ayala-Castañares. In 1981, he was honored for his efforts in furthering coastal studies in Mexico by being named Investigador Extraordinario (distinguished investigator) by the Universidad Nacional Autónoma de México.

Fred worked closely with his graduate students, suggesting topics and ensuring that progress was being made. The time of his tenure at the Marine Foraminiferal Laboratory at Scripps was characterized by a friendly, even cordial, atmosphere. If there was one thing he insisted on, it was that one must show up for the coffee hour in the morning. Most commonly we would talk about the projects that students were working on. Fred rarely volunteered much information; he was a good listener, and had good advice. He genuinely liked his students. Regarding science, his philosophy was to keep it simple: "If you cannot explain it to an intelligent 13-year-old, you really don't know what you are talking about." The message he conveyed was that it is better to solve a simple but important problem, than to attempt a complex one where the outcome is bound to be difficult to interpret. This is good advice for a field in the pioneering stage.

Fred also was a pioneer in public education, in his own low-key way. For example, he was instrumental in setting up a lecture series in which Scripps scientists presented their activities to the public. His friendship with Ted Geisel ("Dr. Seuss") resulted in the writing of several children's books, with Marjorie. These very successful books have taught thousands of children something about ecology.

In the years before his retirement, Fred took on increased commitments in administration, serving as chairman of the Geological Research Division at SIO from 1970 to 1974. One of his aims was to keep process-oriented sedimentology and biostratigraphy well represented at Scripps; his influence is still felt in the composition of the geological faculty. He retired in 1977, but kept coming to the office for several years, taking part in the laboratory's activities. Marjorie's death in 1986 affected him deeply. However, even as his health deteriorated, Fred never lost interest in the various projects going on at "his" laboratory.

Phleger was well recognized for his accomplishments. A Fellow of the Cushman Foundation for Foraminiferal Research, he was a director, was president twice, and in 1980 received the Joseph A. Cushman award. He held memberships in the Paleontological Society, the Society of Economic Paleontologists and Mineralogists, and the Mexican Geological Society. In 1993 he was made an honorary member by the North American Micropaleontology Section of the SEPM (Society for Sedimentary Geology).

Fred Phleger was greatly appreciated by those who knew him. A rather private person, he was unfailingly polite and considerate. However, he could be very firm in his opinions: he had high standards for scientific achievement and personal conduct, and he had a special dislike for bluster and puffery. He lived a full life—as a scientist, a teacher, a family man, and a friend to his students and co-workers.

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