

At a Meeting of the Faculty of Arts and Sciences on November 8, 2005, the following Minute was placed upon the records.

RAYMOND SIEVER

Born: September 14, 1923

Died: September 24, 2004

Raymond Siever, Professor of Geology, *Emeritus*, died September 24, 2004 at his home on Avon Street in Cambridge, a victim of Parkinson's Disease. He will be remembered for his leadership in the field of sedimentary geology, for his excellent work as an educator, and as a benefactor both to his students at Harvard and to the larger geological community.

Ray was born September 14, 1923 in Chicago, Illinois. He attended public schools there in the thirties. A family trip west during this period began an interest in geology that lasted the rest of his life. An interest in music, especially the piano, also formed at this time. Ray studied piano for several years at the American Conservatory of Music in Chicago. As an undergraduate at the University of Chicago in the early forties Ray had to make a major decision on the further course of his life. Geology won, but his love of music never left him, nor did his skills at the piano keyboard. Ray played for relaxation and for the pure pleasure of it. It also remained a major source of enjoyment for family and for friends who were fortunate enough to have the privilege of hearing him play.

The University of Chicago was an exciting place to be in the early years of World War II and those immediately preceding it. Ray was then a graduate student. Renowned scientists converged on Chicago to work in what was then known as the "Metallurgical Laboratory", later moving west to begin the Manhattan Project. The intellectual ferment they generated affected many of the activities there, including the geology program. Ray was attracted, while still an undergraduate, by the work of Francis Pettijohn, a sedimentary petrologist who had done much to further a chemical approach to sedimentary processes and to the rocks so formed. This led to summer employment at the Illinois Geological Survey at Champaign/Urbana (1943-44) to work, among other activities, on the petrology of coal and on possible sources of petroleum.

Ray left the University to enter the U.S. Army Air force in 1944. He had by then met Doris Fisher, who became his wife in 1945. His geological skills served the Air Force in the interpretation of aerial photographs, and in the preparation of maps from them. After the war Ray returned in 1946 to the University of Chicago, completing his doctoral thesis in 1950 under the guidance of Francis Pettijohn. He was, from 1947, also a full-time member of the staff of the Illinois Geological Survey, and gained much from the presence nearby of the geologists at the University of Illinois. A paper written in 1951 received a special award from the American Association of Petroleum Geologists for the best paper written in that year by a geologist under thirty-five. That led, in turn, to a National Science Foundation Senior Postdoctoral Fellowship (1956-57) at Harvard, sponsored by the late Robert M. Garrels.

Ray's arrival at Harvard proved a happy event for Ray, and for Harvard. Bob Garrels, a geochemist, was concerned with the interaction between sediments and natural waters. Bernhard Kummel, a paleontologist who had done extensive work for oil companies, was glad to have a person nearby who knew the geologic setting of Bernie's beloved fossils. One of the committee preparing this minute (JBT),

a metamorphic petrologist, was also in need of Ray's expertise on the diagenetic processes by which sediments consolidate into proper rocks. It should thus be no surprise that Ray stayed on and rose through the academic ranks as a member of the faculty of the Department of Geology (now Earth and Planetary Sciences) until his retirement in 1994. He served twice as its Chairman (1968-71 and 1976-81). While a Guggenheim Fellow in 1981-82, Ray was a Visiting Professor in the Institute of Geology at the University of Tokyo.

Ray's reputation as a teacher began with the introductory physical geology course (Natural Sciences 10) that he taught with Bob Garrels. They presented it in a point-counterpoint style that was extremely effective. The course soon became known, even to the "Confy Guide", as the "Bob and Ray Show", after a popular radio program of the time. It was during this era that Ray and the three colleagues named above, all of about the same age, came to think of themselves as "Young Turks" destined to bring new life to what they regarded as a rather too classically oriented department. As JBT remembers: "Our conspiratorial meetings often took place at the former Wursthau, a place that provided a congenial atmosphere in which friendships could, and did, deepen. Yes, from time to time we disagreed, but discussion was always amicable and devoid of harsh words. It never occurred to us to do otherwise". After the departure from Harvard and later death of Bob Garrels, and the death of Bernie Kummel, the two aging survivors continued to meet at lunch. In the last years, as Parkinson's took its toll, the meetings moved to Avon Street with the happy addition of Doris.

Ray was the acknowledged world expert on the geochemical behavior of silica in near-surface environments. His studies ranged from the weathering of silicate rocks to the formation of feldspars in sediments, and also to the study of diatoms (minute fossils whose remains consist of opaline silica). Ray's papers on the silica budget in the sedimentary cycle (1957), and on the diagenesis of siliceous sediments (1962) are much quoted classics. His work on sandstone began with a paper from his student days published in 1948 in the *Journal of Geology* and continued in the book: "*Sand and Sandstone*", with Paul Potter and Francis Pettijohn (1972). In a 1961 paper in *Science*, Ray proposed detailed study of the interstitial waters in modern sediments as a guide to chemical changes occurring after deposition. Initial studies were done on sediments off Cape Cod, extended in 1965 to sediments in the equatorial Atlantic. Ray devised a special tool called a "squeezer" for the separation of such waters from the sediments containing them. Ray's pioneering approach to the study of interstitial waters has now been applied by thousands of workers to sediments ranging from the mud found in fresh water lakes to the results of deep-sea drilling.

Ray is perhaps best known for the introductory geology textbook "*Earth*", later followed by "*Understanding Earth*" both co-authored with geophysicist Frank Press, initially at MIT, later President of the National Academy of Sciences. These books have now gone through several editions, and were devised to integrate chemistry and physics with geologic processes in a way easily understandable to college freshmen. They have been widely adopted and have had a major effect on the teaching of introductory earth science.

Honors received by Ray include The Presidents Award of the American Association of Petroleum Geologists, and the Francis J. Pettijohn Medal (1999) of the Society of Economic Paleontologists and Mineralogists. He was elected an Honorary Member of the Society for Sedimentary Geology, and received several of their best paper awards (1957-93). He was President (1964) of the Organic Geochemistry Section of the international Geochemical Society, and was elected a Fellow of the

American Academy of Arts and Sciences, of the Geological Society of America, and of the American Association for the Advancement of Science. In 1996 he became an Honorary Fellow of the Geological Society of London. Ray was also a member of the International Association of Sedimentologists, and of the American Geophysical Union, and has served as an Associate in Geology at the Woods Hole Oceanographic Institution, and as a Visiting Scientist at the Scripps Institution of Oceanography.

Ray was a Senior Fellow at Currier House (1976-90), and served on many Harvard committees. Trophies in the house on Avon Street bear witness to achievements of which many of Ray's friends are unaware. He learned fencing in college, continued with it into his early years at Harvard, and became recognized as a championship fencer!

Ray is survived by his wife, Doris; by their two sons: Larry J. of New York City and Michael D. of San Francisco; and by two grandsons.

Respectfully submitted,

Robert A. Berner
Heinrich D. Holland
Paul Hoffman
James B. Thompson, Jr., *Chair*