

Memorial of Robert Minard Garrels August 24, 1916–March 8, 1988

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Robert Minard Garrels of St. Petersburg, Florida, died on March 8, 1988. His death was a shock to the international geological community. We have lost the most influential researcher and teacher in the field of sedimentary geochemistry of this century. Bob's death was even more tragic, because he remained a productive and creative scholar virtually until the moment of his death. Although weakened by cancer, Bob was able to edit a recent book on a subject close to his heart—chemical cycles—and continued to develop new ideas on the formation of Precambrian iron formations.

Bob was born in Detroit, Michigan, the son of John C. and Margaret A. Garrels and brother of John C. Garrels, Jr. and Helen Garrels Murray. He grew up in Detroit with a love for playing the piano. Although I thought he was a great rag-time player, his music teacher apparently did not and told him, "Bob, you play loud and fast, but don't try making it a profession!" Bob began his academic career at the University of Michigan where he received a B.S. degree in 1937 in geology. In 1985 he told a newspaper reporter, "The reason I ended up where I am is people kept telling me I wasn't good enough at other things. I finally got pushed over into an area I was suited for." After Michigan, Bob went on to Northwestern University to obtain his M.S. and Ph.D. degrees, and to begin an association with that institution that spanned over four decades.

My first contact with Bob was shortly after I finished my Ph.D. at Lehigh University. We met at the Bermuda Biological Station for Research in 1962. The station was an institution away from home for both of us, and it became the site of many of our collaborative research efforts in the 60s and 70s. From our first meeting on, I was impressed with Bob's uncanny feeling for a research problem and his deep understanding and genuine feeling for people. These qualities marked Bob as a scholar and man for his whole career.

Bob was not a man to stay very long at any institution. He joined the Northwestern faculty in 1941, associating himself with Ed Dapples, Art Howland, Bill Krumbein, and Larry Sloss. He left in 1952 to become Chief of the Solid States Group of the Geochemistry and Petrology Branch of the United States Geological Survey in Washington, D.C. In 1955 he joined the geology faculty at Harvard University, where he first met Harold Helgeson and Bob Berner. He chaired the department from 1963 to 1965, returning to Northwestern University in 1965. Hal, now at the University of California–Berkeley, and I ac-



companied him to Evanston, joining the Northwestern faculty and continuing our joint research efforts. In 1969 Bob left Evanston for the Scripps Institution of Oceanography, and in 1972 became the Captain James Cook Professor of Oceanography at the University of Hawaii, where he joined one of his close friends, Keith Chave, on the faculty. In 1974 he again returned to Northwestern, leaving there in 1980 to join the Department of Marine Science, University of South Florida, where he held the St. Petersburg Endowed Chair of Marine Science at the time of his death.

Bob was an "holistic" man—a scholar, a teacher, a gentleman, an athlete, and a friend and colleague to many scientists spanning four generations. Bob was a warm human being, and this warmth and concern for people spread over into his teaching. Students of all levels loved him, and his graduate students emulated him.

Bob loved to travel to Europe, particularly Belgium and France, where he spent many hours with Roland

Wollast and Yves Tardy. He enjoyed a cool gin and tonic after a run in Bermuda, an old fashioned after gymnastics in Evanston, an elegant dinner and conversations with friends and colleagues, and the companionship of his wife, Cynthia. He also liked long swims, and a game of tennis, at which he had the frustrating (for his opponents!) habit of lobbing one "where they ain't." Bob's breadth of athletic interest is demonstrated by the fact he currently holds the Master's high jump record!

Perhaps the center of Bob's success was his interdisciplinary talent, his ability to synthesize and integrate, and his feeling for the "cream" of a problem. Bob was one of the giants of the field of geochemistry. He certainly was the recognized "father" of modern sedimentary geochemistry, and his influence on the field of geochemistry has been as great as that of V. M. Goldschmidt. It is true, however, that Bob felt himself to be a geologist. I believe his one over-riding goal was to understand the origin and evolution of Earth's surface environment from a geological point of view.

Most of his scientific contributions including those dealing with the geology and geochemistry of uranium and vanadium deposits, Eh-pH diagrams, chemical models for sea-water speciation, cation-sensitive electrodes, silicate and carbonate mineral stabilities and reactivities, environmental and sedimentary biogeochemical element cycles, and most recently, the first quantitative model of Precambrian iron formation sedimentology and geochemistry were aimed at obtaining the great synthesis of the workings of the surface environment of our planet. He did not complete this synthesis, but until nearly the day of his death he was moving toward it. As an aside, it is interesting to note that V. M. Goldschmidt did not complete his synthesis, *Great System of Metabolism of the Earth*, because of his death in 1947.

Bob loved to communicate his scientific thoughts in informal discussions and in papers, and he enjoyed writing an innovative book. He wrote eight books, including, among others, an introductory textbook in geology; the "bible" on *Solutions, Minerals, and Equilibria* co-authored with Charles Christ; a book dealing with sedimentary rock cycling and one with human interferences in natural chemical cycles, the former co-authored with me and the latter, with Cynthia Garrels and me; *Water, the Web of Life* co-authored with Cynthia; and a compilation of thermodynamic data for minerals at low temperature co-authored with Teri Woods.

Bob received many appropriate honors during his lifetime including election to the U.S. National Academy of Sciences, the Arthur L. Day and Penrose Medals of the Geological Society of America, the V. M. Goldschmidt Medal of the Geochemical Society, the Roebbling Medal of the Mineralogical Society of America, the Wollaston Medal of the Geological Society of London, Doctor Honoris Causa from the Universite Libre de Bruxelles and Universite Louis Pasteur, and an Honorary Doctor of Science from the University of Michigan.

Bob is survived by his wife, Cynthia, his son, James C.

Garrels, and his daughters, Joan F. Beitin and Katherine G. Merrick. His loss will be deeply felt by them and all his friends and colleagues throughout the world. Our science has been deeply affected by Bob's presence. His mark as a scholar and gracious human being has been left on several generations of geologists and geochemists, as well as lay-people.

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