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# Memorial of Eugene N. Cameron, 1910–1999

**PHILIP E. BROWN**

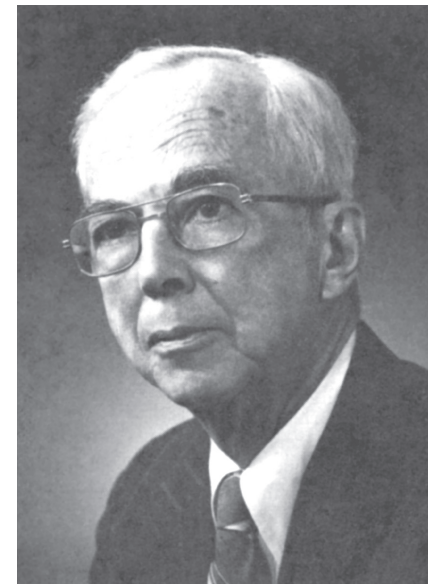
University of Wisconsin—Madison, Department of Geology and Geophysics, 1215 W. Dayton Street, Madison, Wisconsin 53706-1692, U.S.A.

Eugene Cameron, a long-time member and fellow of the Mineralogical Society of America, passed away in Madison, Wisconsin, on April 21, 1999. Thus ended a remarkably full life that had been dedicated to the geosciences, public outreach and education, and his family. Although best known for his ore deposit work and Society of Economic Geologists (SEG) connections, Gene's first professional society membership was with MSA beginning in 1934. During his 65 years of continuous membership he published 13 papers, including his first two, in the American Mineralogist, contributed to the first MSA Special Paper, served on the Council from 1967–1969 and retired in 1981 as a Life Fellow.

Born in Atlanta, GA August 10, 1910, the son of a lumber businessman, Gene's family moved often and he attended 13 different elementary and secondary schools in the East and South. Throughout his childhood he received encouragement toward higher education from his parents even though neither of them had attended college. After Gene graduated from high school, an uncle in New York City, employed as a cashier at the Chase National Bank, got Gene a summer job as a page. In the fall of 1927, Gene enrolled at New York University (NYU) at the behest of his summer boss and other officers of the bank who had taken up a collection to pay his tuition and books. After the first year he got a job working the night shift at the bank while he attended school during the day.

Gene's interest in geology was an accident, he was late registering, and all the biology courses were full. Two enthusiastic and engaging geology teachers at NYU had Gene hooked by the end of his freshman year and began his lifelong appreciation of and support for excellence in teaching. He served as a teaching assistant as a sophomore, a position he held for the rest of his stay at NYU. After graduating in 1932, Gene enrolled in Columbia for graduate work and completed his M.S. in 1934 and his Ph.D. in 1936 although it was not officially awarded until it was published in 1939. Gene studied with Paul Kerr, a superb mineralogist, petrologist, and economic geologist who provided Gene with the breadth of vision that would pervade his science for the next 60 years. His career as a lecturer (1936–1939) and then instructor (1940–1942) at Columbia came to a close when Gene decided to become more directly involved with the war effort and in particular the U.S. Geological Survey effort at resource assessment and evaluation.

During the next five years Gene became one of the world's experts on pegmatites which culminated with the publication in 1949 of Monograph 2 of the SEG entitled "Internal Structure of Granitic Pegmatites" a publication that marks the beginning of the modern literature on these important ore deposits.



Granitic pegmatites thus became the first of six distinct scientific areas to be forever changed by the hand and mind of Gene Cameron.

After the War, C.K. Leith and R.C. Emmons set about reinvigorating and expanding the Department of Geology at the University of Wisconsin by hiring, among others, Gene Cameron. Gene sought out interesting problems and became involved with the research of some of his colleagues—he encouraged Stan Tyler to show some enigmatic "fossils" in an iron formation to an expert—the result was an identification of the oldest life on Earth known at that time. Work on the lead-zinc deposits of southwest Wisconsin followed and began Gene's lifelong mixing of academics, practical and practicing economic geology, and training opportunities for his multinational and talented M.S. and Ph.D. students. In 1950 he started what was to be a 30 year relationship with Union Carbide that began with a consulting job in Southwest Africa looking for rare earth elements usually concentrated in pegmatites.

After examining some tantalum ores in Southwest Africa, his boss suggested that he go to Uganda to look at some additional rare earth element properties—here fate intervened to propel Gene into his most significant undertaking. While waiting in Johannesburg for his visa to be sorted out, he went on a tour of some of the chromite mines of the Bushveld Complex. He could not believe his eyes when he first saw the Steelpoort

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chromite seam, which extends for nearly 80 kms along strike, as much as 3 kms down dip, and is nearly 2 m thick. His report back to Union Carbide was soon followed by a request that he investigate this remarkable ore district further—the rest is, as they say, history.

Parallel with his interest in particular ore deposits, Gene was one of a handful of scientists worldwide who invented the science of reflected light microscopy. His book *Ore Microscopy* was widely used in the 1960s and presented the original recognition that the rotational polarization properties of opaque minerals could be used to help in their identification.

During the 1950s and first half of the 1960s, Gene spearheaded an effort to map the eastern portion of the Bushveld layered complex, understand its origin, and compare it to other lesser but still important layered complexes around the world. Thousands of hours of careful microscope work were required to determine the compositions of both transmitted and opaque phases to pin down the evolution of this remarkable mafic body. Gene realized that as analytical capabilities changed, so might conclusions. Therefore when, in the early-mid 1960s the electron microprobe became available, Gene knew that all his (and his students') work needed to be checked and extended using the greater precision afforded by the new tool. He was instrumental in securing funding in 1966 for the first electron microprobe at Wisconsin. This work on the Bushveld continued until his retirement in 1981. Just days before his death, Gene had the satisfaction of seeing his Bushveld collection moved to the Smithsonian in Washington where it will be curated and made available to researchers throughout the world.

His reputation in reflected light microscopy propelled him into a role as a principle investigator examining samples returned from the moon by the Apollo missions between 1968–1971. This fundamental study of the mineralogy and petrology of the lunar samples was being carried out by many laboratories simultaneously in an exciting era of discovery and Gene Cameron played an important role. This interest in things "loony" was to resurface in a most unlikely form during Gene's retirement.

Beginning with his service with the U.S. Geological Survey during WWII, Gene had an abiding interest in resource issues and in particular communicating to the public the importance of natural resources, our reliance upon them, and the realities of their distribution and extraction. From this interest was born the course that Gene taught at least once a year throughout his time on the Wisconsin faculty—"Minerals As A Public Problem." Enrollment waxed and waned over the years as public opinion and sensitivity to resource issues rose and fell but Gene felt that this was a critically important subject especially as the world became more technologically dependent and the numbers of humans with more than subsistence farming needs increased exponentially. As a result of teaching this course Gene wrote and published a book on the subject after his retirement entitled *At the Crossroads: The Mineral Problems of the United States*.

Gene's final foray into a new area of science grew out of his interest in energy availability and his collaboration with a nuclear fusion technology program. Fusion reactors have yet to reach the energy break even point and several competing designs and fuel mixes are striving to become the model for the future. One of cleanest of these fuel mixes requires the use of a rare isotope of Helium ($He^3$) that is nearly absent on the Earth but is present in the solar wind and has been, over the eons, implanted in portions of the lunar surface. Between 1986 and 1992 Gene served as a consultant to the fusion program as he undertook a reconnaissance study of the amount and distribution of $He^3$ on the moon. Showing his very pragmatic side, in 1992 Gene declined to continue in this role because he had already digested all the data available and in the absence of new data, there was nothing to be gained by further analysis. (The conclusion by the way is that as wild as it seems, there is sufficient $He^3$ on the moon to make a mining operation feasible and it would likely be economical to bring it back to Earth if and when fusion technology becomes a reality. This is the only resource on the moon that could possibly be economical to bring back to the Earth.)

Gene's final professional contribution was vintage Cameron—he chaired the SEG committee that compiled the Society's history volume published in 1997 "*The Society of Economic Geologists, Inc: 75 Years of Progress, 1920—1995*." When several authors were unable to complete their assignments, Gene stepped in and ended up authoring half the volume himself.

The preceding paragraphs paint a picture of a remarkably prolific and diverse geologist and yet this is only half the story. Throughout his tenure at Wisconsin, Gene's students earned 55 M.S. and 35 Ph.D. degrees, he served on innumerable departmental, university, national, and international committees, was Chair of the Geology Department from 1955–1960 and was head of the University Committee during the tumultuous and trying Vietnam War riots that rocked so many campuses but were especially severe on the Madison campus. Gene always brought a professional, considered, gentlemanly approach to all these duties and strongly believed in academic freedom and the precept that the University was an educational, not a political, institution.

Gene also believed, first and foremost that good teaching was THE most important aspect of any University and that it should not be taken for granted nor discounted and relegated to a secondary consideration when evaluating the contributions of faculty. The legacy of a college or university is ultimately the students it produces and to a significant degree these student's successes are traceable to the education and mentorship that they received during their undergraduate and graduate careers. Most of you reading this will agree with these sentiments and quite a number of you would speak even more glowingly about "Supergene," this remarkable scientist, educator, man.

Gene Cameron is survived by his wife of 59 years Adrienne, a daughter, Beatrice, and two sons, James and Donald. Gene's family and colleagues alike will miss him greatly.

Memorial contributions may be made to the University of Wisconsin Foundation for the Eugene N. Cameron Scholarship Fund, c/o Department of Geology and Geophysics, 1215 W. Dayton Street, Madison, WI 53706.

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