A Memorial for Gene Cameron

Emeritus Professor Eugene N. (Gene) Cameron died on April 21, 1999 in Madison. He was born in Atlanta, GA in 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. An uncle in New York City, employed as a cashier at the Chase National Bank, got Gene a summer job as a page after he graduated from high school. In the fall of 1927, Gene enrolled at New York University 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 for one year. 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. As a sophomore at NYU he began working as a teaching assistant, a position he held for the rest of his stay. After graduating in 1932, Gene enrolled in Columbia for graduate work and completed his MS in 1934 and his PhD in 1936 although it was not officially awarded until his dissertation research was published in 1939. Gene studied

Eugene N. Cameron

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 ('36-'39) and then instructor ('40-42') at Columbia

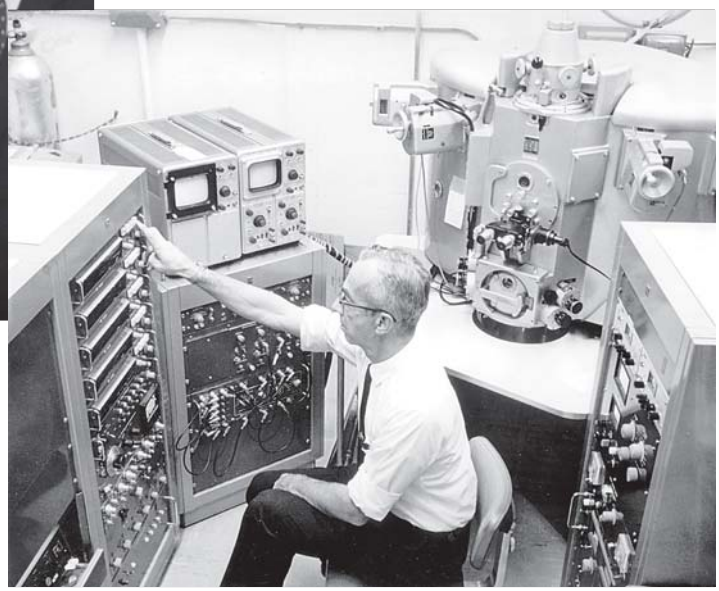
> *Throughout his tenure at Wisconsin, Gene's students earned 55 MS and 35 PhD degrees*

came to a close when Gene decided to become more directly involved with the war effort and the U.S.G.S. 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 of a U.S.G.S. Professional Paper 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 World War II, C.K. Leith and R.C. Emmons set about reinvigorating and expanding the Department of Geology at the University of Wisconsin by hiring Gene, Lowell Laudon, Lew Cline, and George Wollard, among others. 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 SW Wisconsin followed and began Gene's lifelong mixing of academics, practical and practicing economic geology and training opportunities for his multinational and talented MS and PhD 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 elements usually concentrated in pegmatites.

After examining the tantalum ores in SW 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



Left, Gene Cameron at the opening of the new probe lab in 1993, and below, Gene operating the UW's first electon microprobe, a hand-operated, three spectrometer ARL-EMX. He purchased the instrument in 1966.

he first saw the Steelpoort chromite seam which extends for nearly 80 kms along strike, as much as 3 kms down dip and is nearly 2 meters thick. His report back to Union Carbide was soon followed by a request that he investigate this remarkable ore district further—the rest, as they say, is 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—the examination of all those "black things" seen during routine transmitted light microscope study of all manner of rocks. His book *Ore Microscopy* remains an important tool used in the study of ore minerals. Most metallic ore minerals are in fact opaque and thus examination in reflected light is the only way to identify them under the microscope. Their textural relationships hold many clues as to how they came to be in a particular rock and how they might best be liberated from their rocky prison by a mining company.

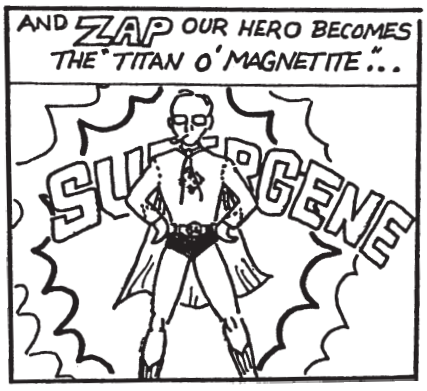
During the 1950s and first half of the 60s, Gene spearheaded an effort to map the entire Bushveld layered complex, understand its origin, and compare it to other lesser but still important layered complexes around the world including the Stillwater Complex just NE of Yellowstone National Park in Montana. 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 200 km long, 10 km deep "bathtub" of mafic igneous rocks. Gene realized that as analytical capabilities changed, so might conclusions. Therefore when, in the early-mid 1960s a Frenchman developed a new analytical tool (the electron microprobe), 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 before his death, his Bushveld collection was moved to the Smithsonian Institution in Washington where it will be curated and made available to researchers throughout the world.

We are now on our third "Probe" and will be formally dedicating the ***Eugene N. Cameron Electron Microprobe Laboratory*** *later this year.*

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 1968-71. This fundamental study of the petrology of the lunar samples was being carried out

by many laboratories simultaneously in an exciting era of discovery; thanks to Gene Cameron Wisconsin had 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.G.S. during the War, 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. This interest struck a strong cord with C.K. Leith who had similar views and who had served on a myriad of government committees and boards since the First World War. Leith was very interested in hiring an economic geologist who would teach a course for non-majors that dealt with these issues—thus was born the course that Gene taught at least once a year throughout his time on the 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—*At the Crossroads: The Mineral Problems of the United States* served as nearly the only textbook for such a course for most of the 1980s.



Gene Cameron was affectionately called "Supergene" by his students.

Gene's final foray into a new area of science grew out of his interest in energy availability and his long collaboration with a nuclear fusion technology program here on campus. 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 (He3) 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 He3 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, wild as it seems, there is sufficient He3 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.)

The preceding paragraphs paint a picture of a remarkably prolific and diverse geologist and yet this is only half the story. He served on innumerable departmental, university, national, and international committees, and was Chair of the Geology Department from 1955-60. He 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 certain degree these student's successes are traceable to the education and mentoring that they received during their undergraduate and graduate careers. I believe that the majority of alumni 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.

Philip E. Brown