

Memorial of Louis H. Fuchs 1915–1991

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Lou Fuchs learned his mineralogy from a stern taskmaster, D. Jerome Fisher at the University of Chicago. It had to have been this training that made Lou the meticulous, thorough researcher that he was. Like Jerry Fisher, Lou never cut corners.

After earning his B.S. in 1940, he put off any thought of further education for the time being because World War II had started in Europe and he felt the U.S. would soon enter it. He worked briefly for the Soil Conservation Service (U.S.D.A.) in 1940 and then enlisted in the U.S. Navy on December 28, 1940. By the time he completed his pilot training at the Pensacola, Florida, Naval Air Station, the United States was at war and Lou was posted to the Pacific Theater. From a number of Pacific island and Australian bases he flew numerous missions in the ungainly, slow, but long-cruising-range flying boats, the Consolidated PBV—a plane still seen flying geophysical surveys in Canada under the name “Canso.” These planes were superb at long-range reconnaissance but were easily outrun and outgunned by Japanese aircraft and had a high loss rate if spotted. Lou once said that each day was like a game of Russian roulette. He survived, rose to the rank of lieutenant commander, received the Navy Air Medal, and was discharged on September 18, 1946. By this time, he had married Viola Fuchs (née Lueck), and they had an infant daughter.

A close friend of Lou's was a chemist in the Manhattan Project. He convinced Lou that he should interview for a position at the (then) new Argonne National Laboratory, one of the national laboratories established as a result of the nuclear research of the war years. Lou was hired and became immersed in research, never to return to school. It always bothered him that he was embedded in an ever-growing sea of Ph.D.'s, but as the years went by and his research reputation grew, more and more—finally all—of his mail came addressed to “Dr. Louis Fuchs.” From the quality of his work younger researchers just assumed he had a doctorate, although he always signed his mail with a “Mr.” Clearly, he had written the equivalent of several Ph.D. theses by the time he retired.

The mission of Argonne National Laboratory was “the peaceful uses of atomic energy,” and during its early years the dream was direct conversion of nuclear energy to a form of useful energy, especially electricity. U extraction and isotope enrichment were the first goals, and uranium ores from many sources were brought to Lou's laboratory for mineralogical characterization. The first step was to determine the U-bearing host minerals, then devise the



process chemistry needed to break them down and obtain a U yield. Many uranium ores are not simply one mineral. Low-temperature ores are usually made up of metastable associations of several, intimately intermixed phases. Lou became a master of techniques to separate out individual phases for optical, physical, and X-ray measurements. He performed the first synthesis of the mineral coffinite during this period, one of the few pieces of work he was able to publish because most of what he did was classified and could only be published within the Atomic Energy Commission, which at that time, in conjunction with the University of Chicago, ran Argonne National Laboratory. It was during these years he developed a steady hand and a sharp eye. He could sample a 15- μm grain for X-ray diffraction by hand—no micro-manipulator involved. In later years, although doubly polished ultrathin sections had come into use, Lou saw more detail in reflected than in transmitted light. I re-

member sitting with him one day as he pointed out that two adjacent olivine grains in a polished section were out of compositional equilibrium with each other by, he estimated, 10–15 mol% fayalite. He said they were slightly different shades of gray in reflected light. They looked utterly identical to me. A week later, on the electron microprobe, I found they were just as he had described them.

Prior to the NASA Apollo lunar program, Lou became interested in meteorite research. Later, under that program, he worked on returned lunar “soils.” He brought his skills to bear on the mineralogy of most groups of meteorites. Lou’s sharp eye led him to spot new minerals in these meteorites. Because many (not all) meteorites appear to be very slowly cooled, highly equilibrated rocks, each new phase has the potential to provide a new constraint on the chemical and thermal history of the parent planetary body. Lou’s interests led him across the gamut of meteorite types, from common chondrites to stony irons and irons, and to the uncommon achondrites and carbonaceous chondrites.

Certainly one of the new mineral finds that tickled him the most was the alkali-transition metal sulfide he named after his mentor, D. Jerome Fisher—djerfisherite. This phase, first found in a meteorite, has turned up in terrestrial mantle rocks, as Lou predicted to me, along with other alkali sulfides. One of Lou’s most notable studies was the detailed mineralogy of a type 2 carbonaceous chondrite from Murchison, Australia. This type of meteorite is particularly difficult to study, consisting of fine-grained refractory inclusions contained in a phyllosilicate matrix in which the grain size is estimated in the 1000-Å range. He found a number of minerals formerly known only in terrestrial occurrences (e.g., whewellite) and established some chemical relationships not known before in this primitive group of carbonaceous meteorites. This study of the Murchison carbonaceous chondrite was almost entirely his work, and it was published as a Smithsonian monograph. Although almost 30 years old, reprint requests are still received for this paper.

Prior to retirement Lou worked on the Allende (type 3) carbonaceous chondrite, which, with Murchison, are the two key examples of these primitive objects from which can be inferred much about the very earliest days of the solar system. Lou was among the first to spot the extraordinary inclusions in Allende, later given the name “Fremdlinge” (foreigners) by one German researcher. Fremdlinge contain assemblages of Pt-group enriched metals and unusual sulfides such as molybdenite. Their origin is puzzling to say the least.

Whenever Lou found a new mineral the invisible hand of Jerry Fisher seemed to fall upon him. He insisted on a full characterization—chemical, optical, physical, X-ray—even if the new find was only 30 μm in size! This was Jerry Fisher’s style. With a single grain Lou would obtain a powder pattern, measure the refractive indices and optical figure, measure the specific gravity, and finally sacrifice it between optically polished mineral plates to find its Mohs hardness. He had infinite patience.

When he retired from Argonne National Laboratory at the end of 1979 he received repeated offers to join meteorite research groups at Caltech, the University of New Mexico, the Max-Planck Institut für Chemie in Mainz, and the University of Chicago. He was, however, experiencing some visual difficulties and the steadiness of his hand wasn’t what he knew it had to be to continue to ferret out grains of interesting minerals. He went home to his hobbies, which occupied him until his untimely death from heart failure on January 7, 1991. He is survived by his wife, Viola, his daughter Janon (professor of neurosciences at the University of West Texas), and his daughter Elaine (professor of molecular biology at the University of Chicago).

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