



Memorial

Paul K. Kuroda (1917–2001)



Paul K. Kuroda was born on 1917 April 1 in Fukuoka Prefecture, Japan, as Kazuo Kuroda, and died at his home in Las Vegas, Nevada on 2001 April 16. He received bachelors and doctoral degrees from the Imperial University of Tokyo where he studied under Professor Kenjiro Kimura. A special lecture by Francis William Aston, in Japan to observe the solar eclipse in 1936, may have sparked Kuroda's future interest in combined studies of radio and cosmochemistry. His first paper was published in 1935, and he became the youngest faculty member at the Imperial University of Tokyo in 1944.

Despite the ban on radiochemistry in occupied Japan and the confiscation of all uranium and thorium minerals and reagents at the university, Kuroda continued his studies of natural radioactives in thermal water, volcanic fumaroles, and rain until 1949, when he sailed to America. En route, he received the Christian name, "Paul".

On arriving in San Francisco in 1949 August, he visited Glenn Seaborg at U.C.-Berkeley. Although Kuroda received the Pure Chemistry Prize of the Chemical Society of Japan that year, as a Japanese national he was not eligible to work on nuclear studies that involved U.S. national security. His 1950–1952 postdoctoral studies at the University of Minnesota with Professors E. B. Sandell and I. M. Kolthoff were in analytical chemistry, but he returned to the study of natural and artificial radioactivity after joining the faculty at the University of Arkansas in 1952.

Fate was kind to Kuroda in the interim. He met Louise Morren, his lovely Dutch wife-to-be, at the University of

Minnesota and he met a nuclear chemist, Dr. Raymond R. Edwards, chairman of the Chemistry Department at the University of Arkansas, at the first combined International Symposia of UPAC and ACS in 1951 September.

Following his move to Arkansas and his marriage to Louise, he became a U.S. citizen in 1955. At the University of Arkansas he trained 64 Ph. D. students, several postdoctoral associates, and he befriended many undergraduate students. He became the first Edgar Wertheim Distinguished Professor of Chemistry in 1979, he officially retired from the University of Arkansas in 1987, but he remained active in research. He was the author or co-author of almost 400 publications.

In nuclear and radiochemistry Kuroda is known for his study of spontaneous fission, for having published the first unclassified report on artificial fission products in rainwater with Paul Damon in 1953, and for isolating Tc-99 from pitchblend with Bernie Kenna in 1961.

In meteoritics and planetary science Kuroda is best known for having predicted, in 1956, that self-sustaining nuclear chain reactions could have occurred naturally in Earth's geologic history and for having predicted, in 1960, that plutonium-244 ($t_{1/2} = 82$ Ma) had been present in the early solar system. On 1972 September 25, the French Atomic Energy Commission reported evidence that a natural nuclear reactor had occurred at Oklo in the Republic of Gabon, Africa, and the presence of excess xenon in the Pasamonte meteorite from the fission of ^{244}Pu was first detected in his laboratory at the University of Arkansas in 1965. Glenn Seaborg and Walter Lovelend selected both of Kuroda's papers on these subjects as 2 of the 85 Benchmark Papers in Nuclear Chemistry (Benchmark Papers, 1982).

His students remember Kuroda for his deep personal commitment to the spirit of scientific inquiry, excellence in teaching, genius at seeing trends in data, love for his family, admiration and paternal kindness for his current and former students, and the sukiyaki dinners that he prepared when we were invited to his home.

In addition to the Pure Chemistry Prize, Kuroda received the University of Arkansas Distinguished Faculty Achievement Award (1963), the ACS Southwest Regional Award (1970), the ACS Southern Chemist Award (1973), the ACS Midwest Regional Award (1977), the ACS Nuclear Applications in Chemistry Award (1978), and the Shibata Prize of the Geochemical Society of Japan (1991). He was the Honor Initiate of Alpha Chi Sigma Fraternity at its 43rd Biennial Conclave in 1996.

Kuroda remained active in research, each year publishing papers on the origin and early history of the solar system. His creativity shows in the final chapter of his career (Kuroda and Myers, 2000) with findings that (a) the $^{244}\text{Pu}/^{136}\text{Xe}$ ages of lunar samples and meteorites indicate formation of the solar system started 5.1 Ga ago, soon after the explosion of a supernova, and (b) the break-up of meteorite parent bodies occurred 4.55 Ga ago, the age generally *assumed* for the solar system in attempts to interpret experimental data of older lead/lead and K/Ar ages.

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(in chronological order)

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