

Clair C. Patterson, Who Established Earth's Age, Is Dead at 73

By William Dicke

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Clair C. Patterson, a geochemist who made the first accurate measurement of Earth's age and raised the alarm about dangerous levels of lead in the environment, died on Tuesday at his home in Sea Ranch, Calif. He was 73.

The cause was an asthma attack, said a spokesman for the California Institute of Technology, where Dr. Patterson had been on the faculty for 40 years.

Although Earth's age, still accepted to be 4.6 billion years, as Dr. Patterson established in 1953, and its level of lead pollution might seem to be disparate subjects, both findings emerged from Dr. Patterson's interest in a single area of study: the geochemistry of metals in rocks, meteorites, water and the atmosphere.

Using extremely precise measurements, he carried out pioneering studies showing that modern people are consuming hundreds of times as much lead as did their prehistoric forebears. This, he said, represented a dire health threat.

His research was cited by environmentalists and scientists who successfully lobbied for the enactment of the Clean Air Act of 1970 and the phasing out of lead in gasoline, the main source of lead in the atmosphere. Earlier this year he was given the \$150,000 Tyler Prize for Environmental Achievement, perhaps the leading international environmental award, for exposing the worldwide health dangers of the uncontrolled use of lead.

In the 1980's, Barclay Kamb, then the provost at Caltech, said Dr. Patterson's thinking and imagination were "so far ahead of the times that he has often gone misunderstood and unappreciated for years, until his colleagues finally caught up and realized he was right."

Dr. Patterson was something of a renegade and criticized what he called "ivory tower scientists." His colleagues said the writer Saul Bellow modeled a disillusioned scientist in the novel "The Dean's December" after Dr. Patterson.

Early in his career, he gained international recognition for a study published in 1953 that concluded that Earth and the solar system were 4.6 billion years old, far older than the rough estimate of three billion years accepted at the time. His figure has been confirmed by subsequent research, said a colleague at Caltech, Dr. Hugh P. Taylor, who said the study was "one of the most remarkable achievements in the whole field of geochemistry."

The study was based on the fact that radioactive elements like uranium and thorium are slowly transmuted, as they decay, into distinctive isotopes of lead over hundreds of millions of years. Dr. Patterson isolated lead from fragments of a meteorite that had struck Earth thousands of years ago, and determined the age of the fragments by analyzing proportions of the lead isotopes. The meteorite is assumed to have been formed at the same time as the rest of the solar system, including Earth.

In perfecting his methods of precisely measuring extremely small amounts of lead in meteorites, he found that lead contamination was ubiquitous in scientific laboratories, throwing off their findings. He then took special precautions, working with plastic equipment in a "clean room" after washing his hands in distilled water and donning a surgical cap.

He began research to determine how much of the lead he had found in the environment was natural and how much had been created by people. He sampled snow from the ice caps of Greenland and Antarctica that had fallen hundreds or thousands of years earlier, showing that there had been significant increases in lead in the Northern Hemisphere when the Greeks and Romans smelted lead in antiquity.

He discovered that millions of years ago the amount of lead stored in microscopic plant and animal life, or plankton, and in ocean sediments was only one-tenth to one-100th the amount now flowing into the oceans from the continents. Studies of bones and teeth of prehistoric people found that they had a tiny percentage of the lead levels found in modern people. Research also showed that a remote canyon in the Sierra Nevada in California was polluted by lead from automobile exhaust fumes in high enough amounts to overwhelm normal plant and animal defenses.

Dr. Patterson was born on June 2, 1922, in Mitchellville, Iowa, near Des Moines. He received a bachelor's degree in chemistry in 1943 from Grinnell College in Iowa, a master's degree from the University of Iowa and a Ph.D. in chemistry from the University of Chicago in 1951. He joined the Caltech faculty as a research fellow in 1952, became a full professor in 1989 and reached emeritus status in 1992.

He was elected to the National Academy of Sciences in 1987. Among the awards he received was the academy's J. Lawrence Smith Medal and the V. M. Goldschmidt Medal of the Geochemical Society.

He is survived by his wife, Lorna, of Sea Ranch; a brother, Paul, of Antigua; a sister, Patricia Stuart, of Altoona, Iowa; two daughters, Susan McCleary of Crawfordsville, Iowa, and Claire May Keister, of Minneapolis; two sons, Charles, of Powell, Ohio, and Cameron, of San Diego, and three grandchildren.

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