

Ignasi Casanova

Institut d'Estudis Espacials de Catalunya,
Barcelona, Spain

Correspondence to:

Ignasi Casanova. Institut d'Estudis Espacials
de Catalunya. Edif. Nexus-201. Gran Capità, 2-4.
08034 Barcelona. Spain.
Tel.: +34-932802088. Fax: +34-932806395.
E-mail: casanova@ieec.fcr.es

Clair C. Patterson (1922–1995), discoverer of the age of the Earth

Clair Patterson (Pat) pioneered several major areas of geochemistry. In his famous paper entitled “Age of meteorites and the Earth” (*Geochimica et Cosmochimica Acta*, 1956, vol. 10, pp. 230–237), he provided the first reliable ages of the Earth and meteorites: about 4,550 million years. He reached this conclusion by utilizing elegant microchemical and precise mass spectrometric techniques for the analysis of the isotopic compositions and concentrations of lead in terrestrial materials and meteorites. This age of 4.55 billion years, observed in different materials of the solar system and confirmed subsequently by others using other techniques and isotopic systems, has been a benchmark for researches by geochemists, geologists, planetary scientists, astronomers

and cosmologists. It ranks among the greatest achievements in science, with important implications not only for geochemistry and planetary science, but also clearly for astronomy, cosmology, biology and, even religion.

He also established the fundamental basis for modeling the isotopic evolution of terrestrial lead, through thoughtful selection and analysis of critical rocks, sediments and waters of the planet. This created a powerful tool for identifying, tracing and evaluating the nature of the major geochemical reservoirs in the crust, mantle, and oceans. As another proof that good basic science is the engine of progress, he also provided the first and still most rigorous analysis of both the natural background and the anthropogenic buildup of lead in the environment. He did this by further extending analytical capabilities for cleanly extracting and analyzing nanogram quantities of lead, and by the design of clever, exhaustive sampling experiments in remote regions of the Earth, in various sea water environments, and in ancient archeological material. We owe to those experiments most of our present understanding of the natural lead levels and distributions, and of the magnitude and origins of anthropogenic lead pollution. His work established that the body burdens of lead in contemporary humans were elevated 1000 fold above those in prehistoric people. Such levels of lead have been shown to be within 3 to 6 fold of poisoning and that significant dysfunctions (some perhaps unrecognized) may result from even present levels. He investigated the concentrations of lead relative to other trace toxic and benign metals in natural food chains. This work yielded important insights into the mechanisms of biopurification of toxic elements in various natural biological processes.

Patterson's work has had a profound effect on all technological utilization of lead (and other metals) and on

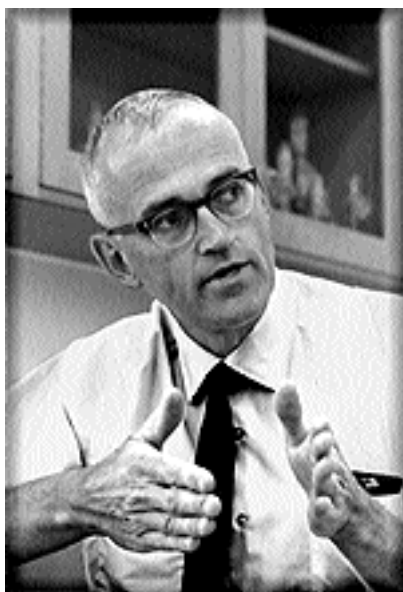


Fig 1. Clair C. Patterson
(1922–1995)

the design of remedial steps to minimize its dangers to health. Not content just to publish the results of his studies he went to great efforts to bring them to the attention of responsible government agencies. He encountered a great deal of criticism and many challenges initially, from industrial and government laboratories. Particularly controversial was his contention that conventional analytical techniques were inadequate to characterize the increased lead insult above natural backgrounds. Subsequent work showed him to be correct on all major points. The quality of human life has been directly and positively impacted by the elimination of lead pipes, lead soldered cans and lead in gasoline.

Clair C. Patterson was a scientist of uncompromising standards and unflinching character who made a difference. He recruited, trained, collaborated with and/or inspired many able students and colleagues who carry on his efforts in several fields. His early mentor, Prof. Harrison Brown, who brought him to Caltech, deserves recognition for his insight and his gift. After his retirement, he undertook a writing effort to educate young people about the vital linkages among scientific understanding, personal integrity, and responsibility to human society. He was as dedicated to this project as to all of his preceding endeavors when he passed away.

Brief chronology

Bachelor of Arts, Grinnell College, Iowa 1943
Master of Science, University of Iowa, 1944
Ph.D. (Chemistry), University of Chicago, 1951
Research Fellow, California Institute of Technology, 1952–53
Senior Research Fellow, 1953–71
Research Associate, 1971–73
Senior Research Associate, 1973–89
Professor of Geochemistry, 1989–92
Professor Emeritus, 1993–95

Honors

1967 Patterson Peak dedicated, 85° 44' South, 55° 59' West,
Queen Maude Mountains, Antarctica
1973 Honorary Doctorate, Grinnell College, Iowa
1973 J. Lawrence Smith Medal, National Academy of Sciences, USA
1975 Doctor Honoris Causa, University of Paris VII
1980 Goldschmidt Medal, The Geochemical Society
1981 Professional Achievement Award, University of Chicago
1983 Asteroid (2511) Patterson dedicated
1987 Elected to the National Academy of Sciences, USA
1995 Tyler World Prize for Environmental Achievement