Geoffrey Eglinton

(1927–2016)

Pioneer of molecular–fossil research.

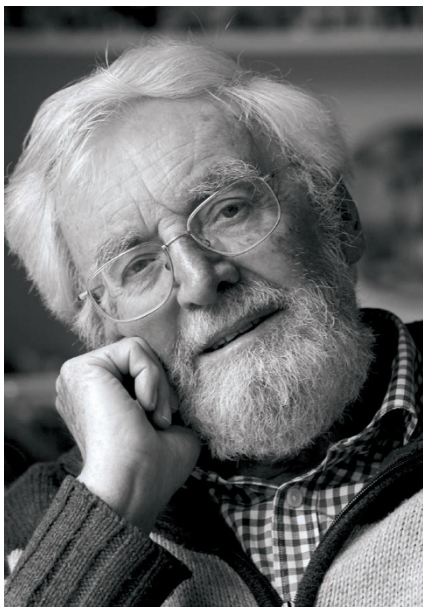
Geoffrey Eglinton was curious about the history of molecules. He followed their passage from living organisms into soils and sediments, and tracked their geological fate in sedimentary rocks and fossil fuels. His exploration of the natural history of biochemicals and their geochemical remnants established the modern field of organic geochemistry. In 1969, he analysed Moon rocks collected by Neil Armstrong and Buzz Aldrin on *Apollo 11*.

Eglinton, who died on 11 March, was born in Cardiff, UK, in 1927. He studied chemistry at the University of Manchester, from where he earned three degrees: a BSc in 1948, a PhD in 1951 and a DSc (a doctorate of science) in 1966. He worked for two years as a postdoctoral researcher at Ohio State University in Columbus and then returned to the United Kingdom as an Imperial Chemical Industries (ICI) fellow at the University of Liverpool. In 1954, he became a lecturer at the University of Glasgow.

Eglinton's original training was in synthetic chemistry. His early accomplishments included devising a new way to form carbon–carbon bonds by joining two compounds, each of which contained a carbon triple bond — a process now known as the Eglinton reaction.

His shift towards the chemistry of natural products, and ultimately to geochemistry, followed the arrival of a new analytical tool in the early 1950s: gas chromatography. The technique, which separates compounds carried by a gas along a liquid surface in a narrow column, proved invaluable to untangling complex mixtures of natural organic compounds. Eglinton was the first to use gas-chromatography separation in the analysis of chemicals called terpenoid lipids, which are found in plants as well as in ancient sediments. Soon, he became interested in the waxy lipids that cover the surfaces, or cuticles, of leaves, and began to determine their distributions.

Waxes protect leaves from water loss and from insects and fungi. During the late 1950s, Eglinton became fascinated with plant-wax compounds, which persist in soils, sediments, rocks and petroleum. In 1960, he took his young family to the University of La Laguna in Tenerife, Spain, for a sun-filled sabbatical. He wanted to discover whether different plant taxa have characteristic patterns of long-chain cuticular lipids; if they did, he knew that the compounds would be of enormous value in reconstructing the ecosystems of the past.



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Eglinton's pioneering work elegantly wove together chemistry, biochemistry and botany, and culminated in a comprehensive paper published in 1967 in *Science* on leaf waxes, which is still a defining document in the field and Eglinton's most cited work (G. Eglinton and R. J. Hamilton *Science* **156,** 1322–1335; 1967). He studied the geochemistry of plant waxes for the rest of his career and well into his retirement. Indeed, his prescient admiration for plants' persistent waxes laid the foundation for their wide use today as palaeoclimate signatures.

In 1963, Eglinton began seeking molecules from the earliest life on Earth, in collaboration with the biochemist and Nobel laureate Melvin Calvin. Eglinton used his analytical expertise to search for biologically derived organic molecules in sedimentary rocks that were more than a billion years old. His work with Calvin revealed that early life had a biochemistry that was fundamentally similar to that of modern cells. The discovery of the startling antiquity of chemical remains from ancient cells sparked people's imaginations, and helped to introduce the concept of 'molecular fossils' to a broad audience.

During the mid-1960s, Eglinton's exquisite studies attracted the interest of researchers at NASA. They recognized that the ancient molecular fossils were definitive biosignatures and that organic geochemistry would be highly useful in studies of lunar samples.

Eglinton's team included the leading organic geochemists of the day. The analytical detective work on the Moon rocks required extreme cleanliness to avoid contamination. So clean were the researchers' methods that they found minute traces of carbon from the solar wind blasted into lunar minerals. The work earned Eglinton the NASA Gold Medal for Exceptional Scientific Achievement and further elevated the growing field of organic geochemistry.

In 1967, Eglinton moved from Glasgow to the University of Bristol, where, with his friend and colleague James Maxwell, he established the Organic Geochemistry Unit (OGU). The OGU quickly became a global centre of excellence in organic geochemistry. Generations of students and postdocs studied fossil molecules there, which they used to study life in and trace the temperature of ancient oceans, and to probe oil transformation in geological basins.

Geoffrey, whom I knew professionally and through friendship with his family, always paid the highest compliment to young scientists: he listened intently to their ideas. After retiring from Bristol in 1993, he continued to work as an emeritus professor and through adjunct appointments with various institutions, including the Swiss Federal Institute of Technology in Zurich, where he often collaborated with his son, Timothy, a professor of biogeoscience and contemporary of mine.

Geoffrey published more than 500 papers and received numerous honours, including being elected fellow of the Royal Society in London. His greatest reward was the work itself and his many collaborations with those who shared his passion. His joy in the rich world of molecular fossils radiates from the pages of a 2008 book that he co-authored with Susan Gaines and Jurgen Rullkotter, *Echoes of Life* (Oxford University Press), which chronicles the science and the scientists that helped him to build the field of organic geochemistry.

Geoffrey was beloved by his wife of more than 60 years, Pam, his children, grandchildren and friends — and by his global scientific family working in the discipline that he founded. ■

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