

DOUGLAS MACLEAN CLARK MACEWAN
MA, BSc, PhD (Edin), FInstP

Douglas M. C. MacEwan was born in Edinburgh on 20 June 1917, and died on 12 March 2000 in Hythe, Kent. He entered Edinburgh University at the age of 16, and in 1941 obtained his PhD in crystallography under the direction of Dr Arnold Beevers for his thesis on "*A machine for the rapid summation of Fourier series*" (1939-1941). This was a completely new research area at that time, as Dr Beevers, who worked with W.L. Bragg, still points out today, at the age of 92.

After obtaining his doctorate Douglas joined the Macaulay Institute of Soil Research, Aberdeen, in 1941, to work on X-ray crystallography of clay minerals, which was to be his area of research throughout his scientific career. Both the theoretical and experimental aspects of his work had an impact internationally. At the Macaulay he worked with Robert Mackenzie, who became a brilliant instigator of research into these minerals with differential thermal analysis, and also a lifelong friend.

In 1946 he joined the new Pedology Department at Rothamsted Experimental Station in Harpenden, Herts. (the director of which was Sir William (Gammie) Ogg, who had left the Macaulay for Rothamsted), where he continued his X-ray crystallography research.

At Rothamsted Douglas directed the doctoral thesis of the Australian K. Norrish ("*The swelling of montmorillonite*"). Another young scientist from abroad, the American Joe White, worked in the Pedology Department on Douglas's recommendation in 1953-1954 and still remembers him with gratitude. Both of them were to achieve eminence in their respective countries.

The research conducted by Douglas at Rothamsted was significant at an international level, and included the treatment of interstratification in clay minerals through Fourier transforms; the preparation, for the first time, of intercalation compounds with neutral organic molecules in laminar silicates; and the determination of their crystal structure through mono-dimensional Fourier synthesis, which requires the prior obtainment of a basal spacing with numerous orders.

Douglas left Rothamsted in 1954, at the invitation of Dr Juan Martín Vivaldi, for Granada (Spain) to lead research into clay minerals at the Experimental Research Station of the Centro Superior de Investigación Científica (Spanish Institute of Scientific Research). His colleagues here included Vivaldi, F. Girela Vilchez (with whom he modified an X-ray diffraction Philips camera for measuring small diffraction angles), J. Cano Ruiz (who was to initiate the intercalation of organic molecules in graphite oxide) and other younger scientists such as M. Rodríguez Gallego (who later became a Professor at the University of Granada), and A. Ruiz Amil whose doctoral thesis on "*Fourier transform methods and interstratified clay minerals*" he directed. Ruiz Amil collaborated with Douglas for many years and together they wrote chapters, in two books, on interstratification in clay minerals. Another of these young scientists, J. A. Rausell Colón, also wrote his doctoral thesis under MacEwan's direction.

Douglas, like other British intellectuals, was seduced by Granada, its customs, way of life and landscape, and he was always to look back on his time in that city in the company of fellow scientists as one of the happiest of his life.

He returned to his native Scotland and spent five years as Senior Lecturer in the Physics Department of Queen's College, today the University of Dundee, where he continued research work with young scientists eager to work with him. These included Hector Howieson Sutherland and myself. On completion of my thesis on compounds of graphite oxide intercalation, I wished to conduct research into the crystal structure of this oxide, which cannot be resolved by X ray diffraction due to the scant information afforded. On Douglas's recommendation I went to Melbourne, Australia, with a postdoctoral fellowship from the Australian Academy of Science, to work with Dr J M Cowley, in the Commonwealth Scientific and Industrial Research Organisation, on electron diffraction, which led to the definitive resolution of the structure of this oxide.

Douglas returned to Spain and continued his research at the Department of Chemistry in the University of Madrid (1964-1967) whose director was Professor Enrique Gutiérrez Ríos, later to be the President of the Spanish Institute of Scientific Research. In my opinion Douglas made two major contributions to science. First, he initiated obtaining intercalation compounds in laminar silicates with neutral organic molecules, independently of W. Bradley in the U.S.A. Based on Douglas's publications in this area, Professor J. D. Bernal of Birbeck College in London, in his "*The Physical Basis of Life*", Proceedings of the Physical Society, section A, 62 (537-558), 1949, set forth his theory of the importance of clay minerals in the origin of life on earth. In a subsequent book with more extensive theoretical and experimental content, "*The Origin of Life*" (1969), Bernal based his theory on later works of Douglas's on intercalation.

Douglas's second important scientific contribution was his research into "*Fourier transform methods for studying X-ray scattering from lamellar systems*", a series of works published by Kolloid-Zeitschrift in 1956, in which he anticipated the resolution of interstratified structures by Fourier transforms by other scientists and marked out a path to be followed by later researchers.

Douglas left Spain and his scientific career in 1967 and moved with his family to Co. Waterford, Ireland, where he set up a publishing business. However, he maintained his scientific contacts with former Spanish and British colleagues. In 1986 he published R. H. S. Robertson's book "*Fuller's Earth: A History of Calcium Montmorillonite*".

In 1960 he was elected a Fellow of the Royal Society of Edinburgh and in 1972 an Honorary Member of the Spanish Clay Minerals Society.

Douglas founded the Clay Minerals Group in 1947 and edited its Bulletin for 10 years. While in Spain he founded the British Conservation Society as a result of his threefold concern about overpopulation, resources and the environment. The Society was to carry out pioneering work in these fields for the next twenty years.

His cultural interests were wide-ranging and included music, literature, ethnology and the history of religions, particularly eastern. His thoughts on the origin of the universe coincided with those put forward by cosmologist Fred Hoyle as regards the notion of a continuity without a beginning or an ending (including his theory of life as a cosmic phenomenon) which was linked to the ideas of eastern religions. Douglas was able to gain much of his information from the original sources, as he spoke fluent French, Spanish, German and Swedish, and could read several other languages.

In the 1970s and '80s he wrote articles and gave lectures on parapsychology, religion and the crisis of science, humanism *vis-à-vis* technology, the conservation of the environment and minority languages. In 1977 he founded the very successful Clan Ewen Society.

Both in human and scientific terms, Douglas had the uncommon capacity to train a group of young scientists – most of them Spanish, for which Spain is indebted to him – who went on to become scientists of international standing, and to whom he had the rare ability to transmit a humanistic outlook.

Douglas is survived by his wife Jean, daughter Helen and son-in-law José Miguel, and his son Neil.

FRANCISCO ARAGÓN DE LA CRUZ