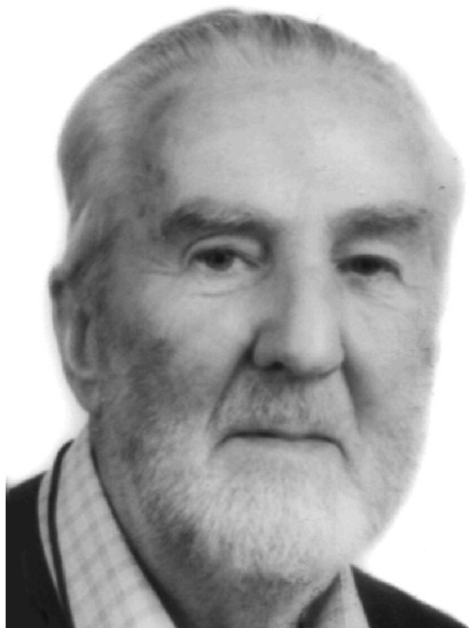


## COLIN FARMER (1920–2006)



Colin Farmer was a brilliant innovative scientist who, in research spanning 60 years, pioneered the use of infrared spectroscopy in mineralogy, particularly its application to clay mineralogy, and additionally made many outstanding contributions to soil science in the field of both inorganic and organic geochemistry. With the exception of a short period immediately after his retirement in 1983, Colin's entire research career was spent at the Macaulay Institute in Aberdeen where, unencumbered by administrative duties, he produced a steady stream of high-quality original papers throughout his working life.

Victor Colin Farmer was born in Woodlawn, County Galway, Ireland on the last day of 1920. Shortly thereafter the family moved to Scotland and Colin was brought up in Ayrshire. He entered the University of Glasgow in 1939 and gained a first class Honours degree in Chemistry in 1943. Following this he was accepted for a PhD in the University of Aberdeen, although his research was conducted largely at the Macaulay Institute for Soil Research under the supervision of Dr R.L. Mitchell, a leading authority on trace element analysis. Colin

gained his PhD in 1947 for a thesis entitled *Spectroscopic Investigations on the Minor Element Content of Plants and Soils*.

Following his appointment to the staff of the Macaulay Institute, Colin's early papers were mainly devoted to the application of spectroscopic techniques to the chemistry of plant components, the way in which they are utilized by soil microbes and the nature of the metabolites so formed. Then in 1955 a landmark event occurred when, at the suggestion of Dr Mitchell, the Institute purchased an Infrared Spectrometer. At the time no-one had a clear idea of just how useful this instrument would be in the Institute's research programme and, in an inspired moment, Colin was asked to lead investigations into the possible application of infrared spectroscopy to soil science. It is difficult to believe that such an open-ended, flexible arrangement would ever be supported in today's atmosphere of strictly accountable and 'relevant' science. However, following an initial period when sample preparation techniques were developed and mastered, the next 25 years saw a quite extraordinary burgeoning of papers on the application of

infrared spectroscopy as an investigative tool in the chemistry of soil minerals, particularly the clay minerals. Not only could the technique be used to identify and characterize these minerals and their reactions, complementing and on many occasions surpassing the ability of X-ray diffraction in this respect, but it could also be used for the study of mineral surfaces and the way in which they interact with adsorbed molecules. Colin's individual contributions to this area of research and his growing international reputation culminated in 1974 in the publication by the Mineralogical Society of a monumental monograph on the 'Infrared Spectra of Minerals'. Colin not only conceived, planned and edited this monograph but also authored many of its individual chapters. Thirty years later this monograph is still in demand and is widely regarded as one of the most authoritative texts on the subject. It firmly established Colin as the leading world expert on the infrared spectroscopy of soil minerals and did much to cement the Macaulay's international reputation for analytical excellence, a feature from which the Institute continues to benefit up to the present day. Colin himself attributed much of this success to the teamwork in the infrared lab, particularly the efforts of his immediate colleagues Jim Russell and Tony Fraser, as well as the stimulation provided by visiting research workers from countries across the globe. Above all, however, Colin appreciated the collaboration of colleagues throughout the Institute and the atmosphere of mutual support and open consultation. In his own words, "our willingness to look at any sample that anyone cared to bring along certainly opened our eyes to the many applications of infrared spectroscopy that we would otherwise have dismissed as impractical or improbable". Regrettably, this free and easy way of working in science now seems to belong to a bygone era.

One of the strengths of infrared spectroscopy is that, unlike X-ray diffraction, it can characterize amorphous materials and structures that lack long range order. In the latter part of his formal employment at the Macaulay Institute, Colin became very much interested in the inorganic amorphous constituents of soils, in particular the tubular paracrystalline mineral imogolite. In a series of papers he showed how this mineral, and related materials, could be identified, characterized and synthesized. Up until this time imogolite was only known to occur in soils derived from volcanic material, principally in Japan, but its occurrence in

podzolic soils in Scotland, later to be found in similar soils across the world, led Colin to put forward a novel theory of podzolization. This theory proposed that podzols form principally through the transport of aluminium and iron down the soil profile as inorganic complexes rather than through the medium of organic complexation, which was the traditional view of soil science. Although it would be true to say that Colin's podzolization theory was not universally accepted by the soil science community, it nevertheless aroused such widespread interest that the papers in which it was described were amongst the most heavily cited papers of the entire Agricultural Research Service in the UK. In fact, Colin's papers have always been heavily cited and even in 2004 the number of papers citing the work of V.C. Farmer exceeded 200.

Colin Farmer's formal employment at the Macaulay Institute ended in 1983 but he was able to continue his scientific research in the capacity of Visiting Professor or Research Fellow in several different countries, including Australia (University of Adelaide and CSIRO Division of Soils), Italy (Istituto di Chimica Agraria, Portici), Canada (University of Saskatchewan) and France (INRA, Versailles). During this time his research was concerned mainly with the conditions of synthesis of amorphous or poorly ordered clay materials and their implications for the genesis of various soil types. It was later found that it was possible for Colin to resume his research at the Macaulay in an honorary capacity and this he did until the time of his death, focusing mainly on the chemistry of aluminium and silicon in soils. In the period after his retirement, Colin authored or co-authored a total of 39 papers and he remained productive until poor health latterly curbed his activities. His last full paper was published in 2005 and described the way in which plant phytoliths control silica concentrations in soil and stream waters.

Throughout his life Colin Farmer retained a genuine passion for science and not only in his own field of research. For many years he represented the British Association for the Advancement of Science in Aberdeen, helping to organize public meetings on a wide variety of topics and entering publicly into debates on topics as far apart as acid rain and the role of prions in Mad Cow disease. In fact, Colin was a formidable advocate in any kind of scientific debate. Referees who sought to change his manuscripts in any way did so at their peril and he

was always prepared to enter the lists to defend his hypotheses and views in public or indeed to criticize those he thought were wrong. But this was always done in the spirit of scientific enquiry in pursuit of the truth, so that there was rarely any breach of friendly relations.

During his career Colin received many honours from the scientific community but probably those that meant most to him were the Pioneer in Clay Science Award of The Clay Minerals Society, granted to him in recognition of his research contributions that led to important new directions in Clay Mineral Science, and the conferment of Distinguished Member status by the Clay Minerals Group of the Mineralogical Society of Great Britain and Ireland, for his lifetime research into clay mineralogy and infrared spectroscopy.

Colin combined his dedication to science with a happy family life and enthusiastic participation in gardening and in hill walking both in Scotland and, during earlier years, in the many countries that he was invited to visit. Colin Farmer died suddenly on August 18, 2006 and is survived by his wife Jane, whom he married in 1947, along with their two sons and a daughter. Sincere sympathy is extended to all the family by all Colin's scientific colleagues.

M. J. WILSON

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