

## ROBERT CAMERON MACKENZIE 1920–2000



Robert Mackenzie (affectionately known as Mack to many of his colleagues) was one of our most eminent and distinguished clay mineralogists and thermal analysts, with an international reputation in both fields that brought him many honours and awards. He was instrumental in developing the Macaulay Institute for Soil Research in Aberdeen as a centre of excellence in soil mineralogy, particularly emphasizing analytical aspects, and played a key role in establishing clay mineralogy as a separate sub-discipline of the mineralogical sciences both in the national and international arenas. He was a pioneer in establishing thermal analysis as an accepted technique to be applied to a wide variety of materials in many different areas of study. He died on 4th July, 2000 following a short period of hospitalization.

Born on 7th May 1920 near the village of Portmahomack on the shores of the Dornoch Firth in the north of Scotland, Robert Mackenzie received his initial education at Tain Royal Academy. He proceeded to the University of Edinburgh where he graduated with first class honours in chemistry in 1942 and quickly gained his PhD in 1944 for studies in the field of gas kinetics. He then chose to take up a post as a soil surveyor at the Macaulay Institute, and although this might seem to have been a rather unusual move for someone whose experience was essentially in experimental science, it did in fact initiate Robert's career along the most fertile and productive lines. At that time, the Macaulay could perhaps best be described as a proto-research institute, with only a handful of scientific staff working in rather basic premises in a converted manor house. But already the staff included two scientists in the persons of Douglas MacEwan and George Walker who would go on to achieve great

renown in clay mineralogy, in addition to Bob Glentworth, a pioneering soil surveyor who had just completed the first detailed survey of agricultural soils in northeast Scotland. This provided an ideal background and stimulus for laboratory-based work of a soil mineralogical and chemical nature. Robert's early work focused upon chemical pre-treatments of clays prior to their X-ray identification and, in collaboration with Bruce Mitchell, he developed a number of chemical dissolution techniques aimed at the characterization of poorly-ordered materials in soils, some of which became standard procedures in soil science.

But at the same time Robert was seeking a more inclusive physical technique that could characterize both crystalline and amorphous materials and he was quick to see the potential of thermal analysis in this respect. He embarked upon a systematic investigation by differential thermal analysis (DTA) of soil clays from Scotland and, as the opportunity arose, from many other parts of the world, eventually acquiring an unrivalled knowledge of what could, and could not, be interpreted from this technique. This research culminated in the publication in 1957 of the first Mineralogical Society Monograph, *The Differential Thermal Investigation of Clays*, a book that Robert conceived, organized, contributed to and edited. Even today this volume is still regarded by many as the best book on the subject. Prior to and concomitant with this major achievement, Robert published extensively on a variety of clay mineralogical topics, including the mineralogy and chemistry of the smectitic minerals, iron and aluminium oxides in soils, the genesis of soil clays, as well as problems related to clay mineral classification and nomenclature. The latter topic interested him greatly, not least one suspects because

it gave him the opportunity to delve into original historical sources, an activity to which he returned throughout his career. His accomplishments in this period were recognized by the award of a DSc degree from the University of Edinburgh in 1957 and by election to the Royal Society of Edinburgh in 1961.

In 1959 Robert was appointed as Head of the Department (later the Division) of Pedology at the Macaulay Institute, thus being confronted with the inevitable conflict between personal research interests and managerial and administrative duties. However, an appropriate balance was indeed struck and under his leadership the Department flourished and gained in stature, increasing in personnel and acquiring the latest in sophisticated analytical equipment. Despite Robert's life-long attachment to thermal analysis, he always recognized that thorough clay mineral analysis demanded a multi-instrumental approach and that each individual technique had its strengths and weaknesses. Independent review groups came and went but generally approved and supported the Department's research activities, which remained strongly focused on the mineralogy and chemistry of soils in relation to soil properties and behaviour. At the same time Robert continued his thermal analytical interests, finally compiling and editing a monumental two volume work on DTA that was published by Academic Press in 1970 (Volume 1) and in 1972 (Volume 2).

It was a great boon to the Department that Robert was so well known in the international sphere and staff benefited greatly from contact with a continual stream of students and visiting scientists from all parts of the world. Many of these visiting researchers went on to achieve eminence in clay mineralogy in their own countries and remembered with affection and gratitude their time at the Macaulay Institute working under Robert's supervision. In his many visits abroad, Robert always regarded the scientists that he met as colleagues and fellow human beings, whatever the political system in which they had to operate, or even the political complexion of the scientists themselves. Thus, in the most frigid days of the Cold War many contacts and friendships were made with Soviet and eastern European scientists. Undoubtedly, such a tolerant and humane attitude helped to foster a sense of community between clay scientists from the eastern and western blocs that transcended politics and was mutually beneficial.

Robert was always keen to encourage interest in clay mineralogy and thermal analysis through society activities and throughout his career played a leading role in this respect in both national and international spheres. He was an editor of great skill and judgement and although his lengthy critiques and numerous amendments sometimes infuriated authors, a period of calm reflection usually convinced them that what was being suggested was not only correct, but also a distinct improvement. Robert continued to serve as a

valued member of the Editorial Board of *Clay Minerals* until 1995.

In 1978 Robert was chosen to serve as President of the Association Internationale Pour l'Etude des Argiles (AIPEA), under whose auspices the international clay conferences are organized. To many, he embodied the very essence of the "English" gentleman (despite being a true Highland Scot), unfailingly courteous and fair-minded, but with a patrician demeanour which invested his lectures and pronouncements with an aura of authority. As it turned out these qualities were very much needed in his term as President of AIPEA, where he was faced with the difficult task of revising the organization's statutes and bye-laws and presenting them for approval at the General Assembly, an undertaking that was successfully accomplished.

In the field of thermal analysis, Robert was closely involved in the setting up of a Thermal Methods Group in 1965 under the auspices of the Society for Analytical Chemistry and became its first chairman. He jointly organized the first International Conference on Thermal Analysis in Aberdeen in 1965 leading to the founding of the International Confederation for Thermal Analysis (ICTA) in 1968 and for a long time, Robert served as treasurer of this organization.

In the course of his distinguished career, Robert was the recipient of many awards and honours. Particularly pleasing for him in the field of thermal analysis was the award of the Gold Medal of the Society for Analytical Chemistry in 1980. His outstanding achievements in clay mineralogy were widely recognized in Europe and at home the Clay Minerals Group conferred on Robert the title of "Distinguished Member" in 1983. He is still the only member of the Group to have received this honour.

Robert retired from the Macaulay Institute in 1983 and at first he may have regarded his retirement as premature. But with the winds of change in science funding blowing ever colder and with support for basic studies in soil mineralogy becoming more and more difficult to obtain, in all probability the timing of his retirement was exactly right. For some years he continued research into thermal analysis in the Department of Chemistry in the University of Aberdeen, but eventually his concern over his wife's ill-health meant that his academic activities had to be very much curtailed, although not altogether discontinued.

On the personal front, it was a privilege and a pleasure to be a colleague of Robert's for so many years at the Macaulay Institute and an honour to succeed him as Head of Department. Of course it was an honour not without problems as Robert was an extremely difficult, if not impossible, act to follow. Robert Mackenzie married Hilda Bruce, a fellow member of staff at the Macaulay Institute, in 1950. She predeceased him in 1998. They are survived by their son Bruce and daughter Morag.

M.J. WILSON