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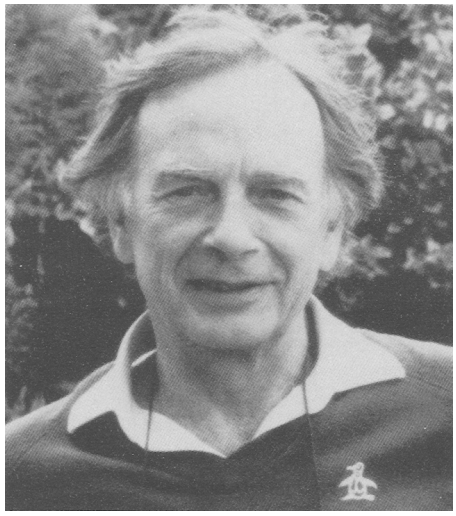
GEORGE BROWN 1926–1996



George Brown, arguably Britain's most eminent clay mineralogist, died on 25th March 1996 after a short illness. During a career at Rothamsted Experimental Station spanning 40 years and five decades, he produced over 70 research papers and other articles. He will, however, be remembered chiefly for his editorship of, and contributions to, the Mineralogical Society's series of monographs on the X-ray Identification and Crystal Structures of Clay Minerals.

George Brown was born in Crawford, Lanarkshire, in 1926. He attended school at Dumfries Academy and the clarity of thought and love and appreciation of the English language instilled by this rigorous Scottish schooling remained with him for the rest of his life. He went up to Glasgow University at a very early age, completing his four-year course of study in 1946, graduating first-class honours in chemistry when barely 20. His studies at Glasgow may well have been greatly aided by the fact that his surname began with a letter near the beginning of the alphabet; students were seated in alphabetical order and such was the hubbub during lectures that only those near the front were able to hear them. Whilst at Glasgow he came under the influence of the crystallographer J.M. Robertson, choosing an X-ray subject for his thesis and research during his fourth year. Robertson formed a particularly high opinion of George and recommended him strongly for the post to which he was appointed at Rothamsted.

The late 1940s saw the formation of the Pedology Department at Rothamsted Experimental Station, probably as a result of the influence of the mineralogist V.M. Goldschmidt on the Director, W.G. Ogg. Studies of clay mineralogy at Rothamsted were begun in the 1930s by G. Nagelschmidt, who joined the Rothamsted staff in 1935, initially using experimental facilities at the Royal Institution. By 1946 it was appreciated that detailed investigations of both the organic and inorganic fractions of soils were essential, and a number of staff, including George and D.M.C. MacEwan, were appointed. In view of his future career, it is amusing to note that the Rothamsted archives record that: "we have found it quite impossible to secure a person with qualifications in mineralogy. We have, however, found a suitable chemist for X-ray work. He is Mr George Brown B.Sc." It is also apparent from Rothamsted records that George's youth (he was still only 20) caused some difficulties with regard to the amount of pay to which he was entitled; an overpayment was inadvertently made and there are several documents discussing whether and how this should be recovered from him.

The atmosphere in the Rothamsted Pedology Department at that time was one of almost complete freedom, in which some outstanding scientists were able to pursue their ideas. It was also still the heroic age of home-made X-ray sets and cameras, of Beevers-Lipson strips, and of analogue computers for Fourier transforms. The apparatus could be dangerous and George suffered an X-ray burn on his arm which never completely disappeared. Much outstanding research was carried out during this period, such as George's location of the exchangeable cations in montmorillonite by Fourier methods, and MacEwan's interpretation of diffraction patterns from interstratified clays by direct Fourier transform of the diffracted intensity. George registered for a PhD but never submitted his thesis, in later years deriving a certain amusement from the fact the he was still 'Mr. Brown'. He preferred instead to include the

work in the first of the monographs on the *X-ray Identificatian and Crystal Structures of Clay Minerals*, edited by G.W. Brindley, which was published in 1951. Later, George edited the second edition of the monograph, published in 1961, and he was co-editor, with Brindley, of the third edition published in 1980. This early period also saw the formation of the Clay Minerals Group of the Mineralogical Society, of which George was Treasurer and, later, Chairman.

Throughout the 1960s and 1970s George continued his activities in X-ray powder diffraction. He was convinced of the importance of good experimental technique, devising, for example, a number of modifications to the standard diffractometer configuration by which he was able to increase greatly the intensity of the diffraction patterns from clays. Unfortunately, he was not an enthusiastic publisher of papers and consequently his accounts of much valuable work from this period can be found only in the Rothamsted Annual Reports (though some was incorporated into the later editions of the monograph). In 1967, almost entirely as a result of his prompting, an X-ray fluorescence spectrometer was purchased, and for the next 15 years George had to devote a considerable amount of effort to the development of this aspect of Rothamsted's facilities for elemental analysis; such work was not merely confined to soils but also encompassed studies of contamination in crops and, in collaboration with the Rothamsted entomologists, 'chemoprinting' of insects.

The 1980s saw a revival of activity in clay mineralogy at Rothamsted and George was able to play a vital part in this. He was quick to grasp the very significant advantages offered by the collection of diffraction patterns in digital form, in particular the possibilities of increased sensitivity by the use of difference methods and of automatic analysis using expert systems. In one of his last pieces of experimental work he showed that careful analysis of digital, step-scanned patterns could readily reveal the mechanical deficiencies of the generation of X-ray powder diffractometers that were then current; it is likely that this work was not insignificant in prompting the manufacture of the mechanically massive, angle-encoded instruments that are available today. George formally retired from his post as a Principal Scientific Officer at Rothamsted in 1986 but he continued to work actively in the laboratory until clay mineralogy there ceased in 1988.

Apart from his experimental abilities, George's other great strength was the clarity and precision of his thinking. Like many crystallographers, he was firmly convinced of the importance of the proper use of terminology – woe betide, for example, any author who confused layers, interlayers and structure units when describing layer silicates. He did not suffer fools gladly and had little time for scientific 'wafflers'. This did not reflect any arrogance on his part – he was essentially a modest man – but rather his disappointment that they had not taken the trouble to understand the subject properly. Others who worked with him have said that he could, at times, be difficult, though I never found him so. However, his caution and concern to get things right might well have sometimes led to friction with colleagues, as evidenced by the acknowledgement in a paper from Rothamsted: "The authors wish to thank G. Brown for XRD determinations. The conclusions drawn from the data are the authors' responsibility". Some scientists, such as J.M. Robertson, Kathleen Lonsdale and V.M. Goldschmidt, he respected greatly; he was a particular devotee of Goldschmidt and was delighted to find that they shared the same untidy working habits and stratigraphic filing system. Those in exalted positions who failed to live up to George's high standards could also expect a rough ride. During his early days, he attended the MSc course in crystallography at Birkbeck College and made a point during the lectures of challenging anything he thought was incorrect or which he (or the lecturer!) did not understand. Even quite senior members of the College could be seen feverishly revising their notes before facing George at a lecture.

Most of the time, especially in his latter years, he could be a most amusing friend and companion, with a fine dry sense of humour. In the old days of Rothamsted Christmas parties he co-authored several very funny satirical scripts. He was also a fine games player of soccer, tennis, table tennis and especially hockey.

There can be few, if any, scientists involved with research on clay minerals whose path has not been eased by George's work in editing the monographs on the *Crystal Structures of Clay Minerals and their X-ray Identification*. The final version of this classic text, edited jointly with G.W. Brindley, will remain a definitive work for many years to come. When I was offered a position at Rothamsted to work with him in the early 1980's, I knew little of him other than vaguely as the editor of a book on clays. I, therefore, asked a crystallographer working in another Department at Rothamsted what I should expect. I was told that "George has the reputation of being very difficult, but he has never been anything but helpful to us. I think that he is a very able and careful scientist and, if you care about science and about doing things properly, you will get on with him very well". I spent five excellent years working with George. I admired his scholarship, his clarity of thought, his vast knowledge of clay minerals, his dry sense of humour and his total lack of self-importance. He was a fine scientist and a considerable scholar whose talents during his latter years were, perhaps, never properly realised or appreciated by many at Rothamsted. He will be greatly missed.

I.G. Wood

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