

Obituary

Robert Michael Sumner Perrin, 1921–2023

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A pioneer in the science of pedology

Robert ‘Bob’ Perrin (Fig. 1) died as the result of a stroke on 2 September 2023 at the great age of 102. He was the last surviving member of the second tranche of scientists responsible for the setting up of the Clay Minerals Group of the Mineralogical Society of Great Britain and Ireland (as it was at that time) in 1948 and the early stages of its subsequent development. He was based at the University of Cambridge, where he was a pioneer in the science of pedology, setting up a first-class research and teaching laboratory initially in the Department of Agriculture and then in the Department of Applied Biology. Perrin was a well-organized and excellent teacher; he fostered all aspects of pedology and was responsible for enabling the geological importance of clays

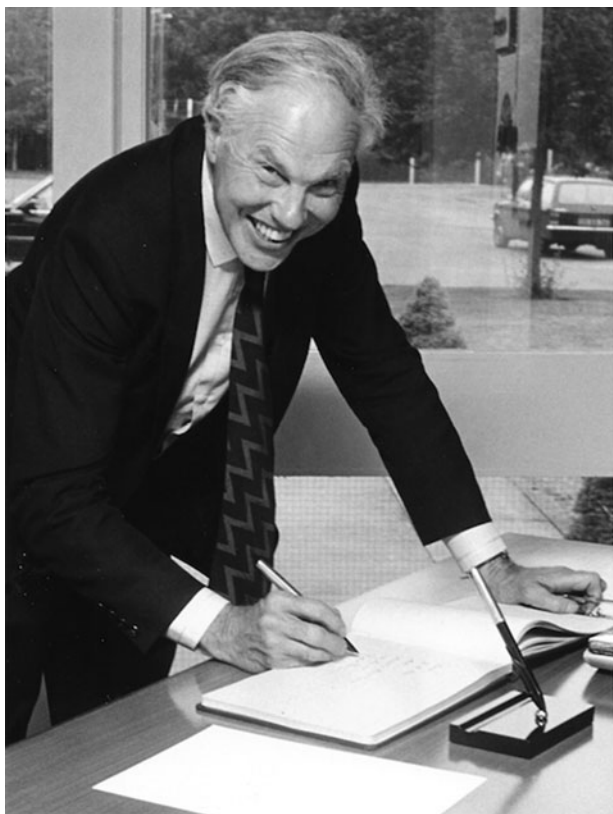


Figure 1. Robert ‘Bob’ Perrin visiting the Royal Electrical and Mechanical Engineers during his year as Master of the Armourers and Brasiers (June 1985–1986).

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and clay minerals of the British Isles to gain a precarious foothold in the university. With time and after various misadventures, this ended up with the present Department of Earth Sciences having a clay mineralogist, N.J. Tosca, as the Professor of Mineralogy and Petrology, with interests extending not just to the surface of the Earth but also to that of Mars as well as of other planets.

Perrin’s contribution to the studies and teaching of soils, their clay mineralogy and their interplay with engineering and material science is best viewed in three sections: his experience in the Royal Engineers during World War II; teaching and research at the University of Cambridge; and, after his retirement, as Master (in 1985) of the Worshipful Company of Armourers and Brasiers, one of the City of London’s ancient Livery Companies.

World War II

In 1939, shortly before World War II was declared, Perrin was 18, a successful schoolboy, head of his house and captain of cross-country running. He had just completed his time at Shrewsbury School, an ancient public school on the banks of the River Severn. He had been accepted by Kings College to study chemistry at Cambridge; the young Perrin volunteered to join the army, however, putting his university plans on hold. As a commissioned officer in the Royal Engineers, he soon became aware that aspects of soil, its stability and water supplies and the use of aerial photography for soil mapping were all very important considerations in ground warfare. He served in Egypt and briefly in Syria before taking part in the Italian campaign, for which he was mentioned in despatches. This involved landings in Sicily and Salerno, campaigning through Naples to the River Garigliano below Cassino. He was involved in the third landing and the breakout at Anzio before entering Rome with the Americans. In May 1945 he qualified as an air observational post pilot, and in 1946 he served in India on the North-West Frontier just prior to Indian independence.

Education and teaching: universities of Bangor and of Cambridge

After demobbing in October 1946 at the age of 25, Captain Perrin started his university education, first at University College of North Wales (now Bangor University), where he obtained a BSc in Chemistry and Agricultural Chemistry, and then at the University of Cambridge with a BA and MA in Chemistry followed by his PhD – *Studies in Pedogenesis* – in the Department of Agriculture (1955). Perrin, now 34 years old, was first employed by the university as an Assistant in Research, then as a University Demonstrator and finally as the University Lecturer in Soil Science (1958). Perrin arrived in the

Department of Agriculture at a time when it was facing a difficult future. The British Empire was in rapid decline, with the loss of many colonies. The head of the Department of Agriculture, Professor Sir Frank Engledow (Bell, 1986), a famous plant crop breeder, was a man of great energy and ability and is said to have run Britain's and the Empire's agricultural policy 'single handed'. He was nearing the end of his 27 year stint (1930–1957) of running a department that was geared both to advancing important aspects of agricultural science but also to training a constant stream of students sourced from the Colonial Agricultural Services studying for diplomas. Changes were also taking place in the university's Tripos examinations. Student numbers were dropping. There was also the backcloth that the university never really approved of certain aspects of the course (Land Economy), as they were deemed incompatible with a university education. However, support for the establishment of the department came originally from the Government and the colleges, with their large land holdings. The Drapers Chair of Agriculture was established in 1899 by the Drapers Company, one of the 12 Great Livery Companies in the City of London. This obtained its Royal Charter in 1364, bringing together the woollen-cloth merchants of the City. Since the 16th century, it has founded schools and colleges using funds donated by its members. It is very likely that the arrival of the determined Perrin – a very capable chemist, energetic and experienced in many terrains – in the department must have delighted Engledow. There was the likelihood that a better understanding of the fundamental mechanisms and properties of soil development on different geological substrates under various climatic conditions would benefit agriculture and food production greatly. Engledow ensured that Perrin's supervisor, actually from outside the university, was the best person for the study of soils – Sir William Gammie Ogg, Head of the Soil Survey of England and Wales and the Director the Rothamsted Agricultural Experimental Station. Perrin's thesis, entitled *Studies in Pedogenesis* (1955), consisted of two parts: the first dealing with the soils developed on the English Chalk, the second with those on the Calcareous Till of the Breckland District. It demonstrated his chemical and mineralogical skills and his appreciation of the complexity of soil formation and derivation, and also his practical engineering skills. He constructed, using scrap and discards, his own X-ray generator with Brindley–Robinson cameras for his study of clay minerals. Perrin wrote in his introduction: 'The work reported in these dissertations is being done with the strong conviction that pedology (which was defined by Robinson (1949) as the study of soil by the methods and from the standpoint of pure science) has now reached a stage when it must begin to attain, if not the same importance, at least the same academic status as geology.' This may have been music to the ears of Engledow, giving a possible lifeline for his department to grow into or establish itself as a stabilizing factor in its survival.

Perrin quickly established his research and teaching laboratories on the first floor of the building in the Downing Site, with his X-ray diffraction equipment located in the loft. This is where, as a research student (based in the Department of Geology), I spent much of 1964 and 1965 carrying out my own clay mineral research into the Chalk (Jeans, 1968). In 1956, Perrin re-engaged with the military, becoming a member of the Geologists' Pool, Royal Engineers in the Army Emergency Reserve – his captain's army uniform hanging in the loft adjacent to the X-ray diffraction set-up (Rose, 2023). He served as a soil specialist for 10 years, taking part in projects in Malaya and East Africa, retiring as a Major

in 1966. This added greatly to his experience and teaching of tropical soils and their development. Perrin realized that two factors limited the rapid growth of pedology in Britain (and elsewhere) as an independent science. The first was that knowledge of the clay mineralogy of the sedimentary rocks in Britain on which soils had developed was very limited and that one cannot study the origin of soils without knowledge of the underlying strata/rocks; and secondly, the varying approaches to quantitative clay mineral analysis often meant that results from different laboratories were not comparable. His Mineralogical Society publication *Clay Mineralogy of British Sediments* (Perrin, 1971) brought together all available data at the time and included the test results of clay mineral analyses of the same samples carried out at a number of leading laboratories. Both the knowledge of clay mineralogy and the consistency of results from different research groups represented important goals to follow. It took the clay minerals world more than 30 years to achieve either of these objectives. In 2002, The Clay Minerals Society established a biannual, open competition – the Reynolds Cup, in which laboratories vie to achieve the best set of analytical results for three unknown mineral mixtures – that has seen much support around the world. This has led to a greater appreciation of the problem and also to greater consistency in quantitative clay mineral analysis. The first comprehensive attempt to elucidate the clay mineral stratigraphy of a large regional area followed soon after; this covered the British Isles and surrounding offshore regions (Jeans & Merriman, 2006).

Engledow retired in 1957 as head of the Department of Agriculture. His successor, Joseph Burrut Hutchinson (1902–1988), an agricultural administrator and an expert in cotton genetics (from the overseas Empire Cotton Growing Corporation), was a much less forceful and energetic character. He was nearing his overseas retiring age of 56 years. He was looking for a position to fill in the time between this retirement and the later retirement age of 69 years in Britain. He considered the Directorship of the Rothamsted Agricultural Experimental Station as well as the Chair of Genetics at Cambridge, but he ended up as the Drapers Professor of Agriculture (Arnold, 1991). He had no clear and strong ideas about how to rescue the department from its dilemma of much reduced student numbers. As a consequence, the University Grants Committee suggested that Cambridge should drop the teaching of practical agriculture, as the need was already met by other universities and colleges in the UK. The Department of Agriculture was suppressed in 1969, and with it went Perrin's dream of a more major role for pedology. The university convened a committee under J.W.L. Beament to consider its future and reallocation of the teaching staff. Beament was offered the Drapers Chair of Agriculture and asked to set up a Department of Applied Biology in the Austin Wing of the Old Cavendish Physics Laboratory.

In the meantime, between 1967 and 1972, I took up the baton for the Clay Mineralogy of British Sediments project by returning to the Department of Geology (Sedgwick Museum) with the support of Maurice Black (Reader in Sedimentary Petrology) and the Natural Environment Research Council (NERC). The major workhorse was no longer Perrin's Robinson–Brindley X-ray cameras, but the Phillips X-ray diffractometer in the adjacent Department of Mineralogy and Petrology.

Department of Applied Biology

In 1973, I rejoined Perrin in the Department of Applied Biology on the understanding that: (1) I would help with the teaching, for

which I was paid, of his part of the Environment Course that was a major component of the honours degree course; and (2) I would pay bench fees. Otherwise, I was free to pursue any means by which the clay stratigraphy project could be financed and kept going – first on a 2 year project financed by Laporte Industries Ltd (overseen by Barbara Neumann and Derek Oliver) looking for new deposits of fuller's earth, then consulting, running conferences for the hydrocarbon industry and expert witnessing in criminal trials. X-ray diffraction analysis was still conducted in the Department of Mineralogy but helped by a new Phillips X-ray diffractometer with an automatic sample changer. It was during this period of 10 years (1973–1983) that I fully came to appreciate Perrin's ability, dedication and enthusiasm as a lecturer and as a demonstrator in the field. His environmental course, both in the laboratory and in the field, covered everything from the physics and chemistry of soils and their pore fluids, natural waters, mineralogy and relation to climatic patterns, topography and vegetation. He also extended his lectures on low-temperature water geochemistry to the Department of Geology. The soils field trips to East Anglia were outstanding for the breadth of their content and their clarity, combining observation with chemical testing in the field and never forgetting the need of a pub with good beer for lunch! His laboratory classes were of no less a standard. The 'chemistry of waters' practical used samples collected on the day and the night before from locations as far distant as Wales.

Retirement and the Worshipful Company of Armourers and Brasiers

Perrin took early retirement in 1983 from the University of Cambridge at the age of 62 years and, with his wife, Wendy (née Oliver), then of ~37 years' standing, he left Cambridge and settled in a new home (The Wilderness) at Dartmouth, Devon, immediately adjacent to the sea. Here he could indulge his newly developed hobby of growing heathers on the acid soils of their steep rocky garden going down to the water's edge and his love of sailing on his yacht, the 9 ton *Hilyard*, with his friends. Also owning a share of the *Hilyard* was C.A.H. Hodge, another soil scientist very active in eastern England (Hodge, 1966, 1991; Hodge *et al.*, 1984). Many of Perrin's earlier trips involved soil sampling, always with his spade, producing piles of soil samples for which space needed to be found in his laboratory.

Perrin's retirement gave him the time and opportunity to play a major role in redirecting the wealth and influence of a famous Livery Company in the City of London to educational and research purposes. This third phase of Perrin's contribution to material sciences can be traced to his father, Michael Perrin, who was an engineer by profession. After World War I, the elder Perrin had founded a firm of mechanical and hydroelectrical engineers, Perrins Ltd, of which he was managing director. Later, he also founded three other engineering firms, the last being Exeter Munitions Ltd in 1940 for the manufacture of urgently needed military components. The young Perrin must have had engineering in his blood. At a very young age, he started up his father's Austin 7 and reversed it through the unopened garage doors behind him! A love of these cars remained with him until he sold his last one ~7 years ago. It seems no coincidence that he joined the Royal Engineers at the start of World War II and that he should have ended his university career in the Austin Wing of the Cavendish Laboratory in Cambridge – the

home of the Department of Applied Biology – that was financed by a very generous donation of £250 000 from and named after Sir Herbert Austin (later Lord Austin), whose firm designed and built the Austin 7, the first 'people's car' of Britain.

Robert had been apprenticed to the Worshipful Company of Armourers and Brasiers in 1938 through a business connection of his father's and had followed the usual progression as a Freeman and Liveryman. It was a time when the company had rather lost its way. The Worshipful Company of Armourers was set up in 1322 as the guild overseeing the production of armour, and it was joined by the Brasiers in 1708. Its charitable purpose was clear: to help, provide and train skilled artisans and to maintain standards, when body armour was a very important component of the British Army. In more recent years, it continued more as a privileged dining club whose charitable status with its untaxed income could easily catch the eye of a socialist government. Perrin and his good friend and fellow liveryman J.E.T. Horne (1918–1999; Bain, 1999) were both well aware of this problem. Horne became Master of the Guild in 1982 and Chairman of the Metals Steering Committee overseeing the problem. However, it was Perrin who took the problem in hand when he became Master in June 1985. This is his account of their actions:

In February 1986 I chaired a meeting of members of the Company with delegates from universities and industry to determine how the Armourers might best give support to metallurgy. This led to the establishment of the Metals Committee (later renamed the Material Science Committee) and our policy of giving support, first in metals and then materials science as a whole, to successive levels of education and attainment from primary schools up to the Royal Society Medal. I played a leading part in the implementation of these programmes which now disburse nearly a quarter of a million pounds each year. My contribution was rewarded with the Honorary Fellowship of the Institute of Materials, Minerals and Mining (Hons. FIMMM). The Institute now awards a Robert Perrin Medal annually.

In the company's history, Perrin's contribution to returning it to its main purpose and out of the possible clutches of a socialist government is described and is summarized thus: 'His devotion to and enthusiastic support for the objects of the Material Science Committee have been an enduring inspiration to the Company so he has not only been the originator, but the continuer of the same.'

Robert and Wendy left Dartmouth in 2006, moving to an apartment in Flete House near Ivybridge. Always intellectually curious and interested in the topography and landscape around him, Robert was involved with two local history projects. The first was the compilation of a Heritage Appraisal (i.e. a sites and monuments record) of the parish of Ugborough, and the second was a chronological survey of Flete House as depicted in maps and charts. This was compiled as a documentary film with the assistance of Adrian Wardle and completed shortly before his death. His wife, Wendy, predeceased him in 2016 after 69 years of marriage. They had two children, Nicola (born 31 August 1954), a retired barrister who worked for the Crown Prosecution Service, and Christopher (born 12 October 1956), a solicitor who was a senior partner at Clifford Chance.

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