

OBITUARY

## William Robert Dearman

William (Bill) Dearman was a hard-rock geologist of the 'old school', rooted in fieldwork, mapping, structural geology, mineralogy and petrology; interests that he pursued and practiced throughout his career and which resulted in him leading the development in the UK of mapping for the needs of engineering geologists, of being the senior voice of UK engineering geology on the European continent, and of becoming, in 1972, the first Professor of Engineering Geology in the UK. He was a member of the *Géotechnique* Advisory Panel from 1972 to 1974, an active member of the International Association of Engineering Geology (IAEG), was awarded the Hans Cloos medal of the IAEG in 1990 and the William Smith medal of the Geological Society of London in 1991. His book *Engineering Geological Mapping* was published in 1991.

Dearman was a Londoner whose interest in geology was awakened by his teacher, exemplar and mentor at Westminster City School, Mr. Parsons (Reeves, 2008). Parsons was a Fellow of the Geological Society of London, a small and exciting community with more than its fair share of idiosyncratic and charismatic luminaries, including Sir Edward Bailey at the Geological Survey in Exhibition Road, Professor H. H. Read of Imperial College, just around the corner, and Mr Percy Bottley of Old Church Street in Chelsea, supplier of geological hammers, minerals, rocks and precious specimens. Bailey and Read were academic giants but Bottley was renowned for quite a different reason; his establishment was more of a scree within a warehouse rather than a shop and all who called on him discovered a wonderland where every imaginable rock could be studied – provided you were prepared to rummage. This appealed immensely to the sense of mischief within the young man and was infinitely better to an aspiring geologist than the Geological Museum of the day and to any collection in school or college, and fair compensation for lack of topography and hard rocks within the London Basin that might catch the imagination. South Kensington was the place to be and it was to the geology department at Imperial that Dearman went upon leaving Westminster.

Given that the country was now at war the study of geology would seem somewhat inapt but the fact was the nation was facing isolation and great efforts were quietly being made by the staff of the Geological Survey – with the help of geologists in academia and industry – to locate, record, assess and where necessary exploit, the mineral resources of the UK in the expectation that these may have to be won entirely from within its own borders. Competence in practical geology was a national priority not only at home but overseas too, where ground conditions and water supplies were being assessed for a variety of military purposes; there were too few geologists.

London came under attack during the blitz and many left the capital, however owners and occupants of most buildings arranged for fire watchers to patrol their roofs and at college this was undertaken by the staff and students alike; fire watching and fieldwork were to create bonds that lasted a life time. Despite these distractions Dearman graduated in 1943 with a first-class degree in geology from London University. Unknown to him preparations were underway for the Allied landings at Normandy the following year and the then 'Southern Railway', which was to play a vital role in

the movement of troops and materials through southern England, was in need of a geologist.

Southern Railway needed a guaranteed supply of ballast; it had its own quarry for this at Meldon, near Okehampton, on the edge of the Dartmoor granite. This granite is surrounded by a metamorphosed aureole penetrated by hydrothermal mineralisation, making it a hunting ground for mineral collectors. It was through this connection that the then consultant for the development of quarry, Mr W. Dinwoodie, approached Percy Bottley, a known purchaser of minerals and rocks from the quarry, to enquire where a geologist might be found. Reed was consulted and Dearman dispatched to the comparative quiet of Devon as the geologist to the chief engineer's department of Southern Railway.

The problem at Meldon was rock quality for the quarry cut through the folded and faulted sedimentary rocks deformed and metamorphosed by the intrusion of the Dartmoor granite pluton. This produced very good and very bad rock in juxtaposition and it was necessary to understand the three-dimensional geology to enable the good to be separated from the bad, and for an adequate supply of good aggregate to be maintained. Dearman realised that whole quarry faces had to be mapped in the vertical plane, an unusual form of mapping then – in order to predict what the next blast would yield. Blasting was carried out once a week, which was on an extraordinarily large scale for those times, and could create enough poor quality rock to cut the weekly production of good stone significantly. So started Dearman's interest in the difficulties of mapping for engineering purposes. A consequence of this was his unique and superb collection of vertical cross-sections through the margin of the granite; the first of such studies and a significant contribution to our understanding of the emplacement of granites – a subject much discussed by the firewatchers from geology and metallurgy years before.

Meldon was not the only problem Dearman faced; track movement at Folkestone Warren on the south coast was a constant concern. The chalk of the warren was just about as soft a rock as a hard-rock geologist like Dearman would be comfortable to work with. Many geologists of the time did not understand why sediments beneath rock, such as the Gault beneath the chalk, were still clay and quite a few considered working with the post-Cretaceous geology of southern England as the equivalent to 'gardening'. It was therefore probably fortunate that Mr Alan Muir-Wood (later to be Sir), who joined the Southern Railway in 1946 as an engineer and was delegated to review the stability of the Folkestone Warren, called not on the geologist to the chief engineer's department, but on the expertise of his aunt, the palaeontologist Helen Marguerite Muir-Wood of the Natural History Museum in South Kensington. Some 26 years later Dearman would be sitting around the same table as Muir-Wood, as a member of the Advisory Panel for *Géotechnique*.

After the war the railways were nationalised and prospects for a geologist at Meldon were not particularly attractive. The best of the alternatives were the Overseas Geological Survey, which meant working in the tropics, the National Coal Board, which meant working in the same temperatures and humidity, but underground, or academia. So Dearman stayed on, as employment at Meldon provided the opportunity to use his unique data as the basis for a PhD, and this

he did under the supervision of the structural geologist and mining engineer Dr Gilbert Wilson at Imperial College, obtaining his PhD in 1951. Later, Dearman never tired of pointing out to questioning and awkward academics how unfortunate it was that he had to systematically and deliberately destroy his field evidence, reducing it to rubble now spread uniformly under the railway tracks of southern England!

He extended his studies from Meldon to the south-west peninsular and identified the Sticklepath Fault, a major transcurrent feature associated with local and intermittent seismicity, and the family of faults associated with it. Further, by plotting the result of reversing the displacement on these faults he produced the first map of the peninsular as it would have been prior to the Alpine orogeny. All this served him well when applying for the post of Lecturer in Economic Geology at Kings College Durham, to which he was appointed in 1956, assisting with courses of structural geology and mineralogy. Kings College Durham was actually located in Newcastle and administered by the University of Newcastle, where the Professor of Geology, Stanley Westoll, was very keen to see Dearman develop courses in geology for the mining and civil engineers, from which came an undergraduate degree programme in engineering geology in 1968. This was the year Dearman was made Reader of Engineering Geology. Kings eventually became a constituent of the University of Newcastle, and was named Armstrong College.

Engineering geology was now emerging as an identifiable subject in industry and in academia and support was canvassed for the creation of an Engineering Group within the Geological Society. Dearman supported this and became a member of its first committee in 1964. The group identified four priorities: the establishment of its own journal, recommended practice for core logging, guidance on mapping (very much the area for Dearman) and chartership for professional geologists in engineering. The *Quarterly Journal of Engineering Geology* (QJEG) first appeared in September 1967 and a working party for the 'Preparation of maps and plans in terms of engineering geology' was established in 1968, with Dearman a member. The following year Dearman became editor for the QJEG at the start of its second volume in 1969, and, following the sudden death of Dr. Jack Ineson, assumed chairmanship of the working party in 1970. It was through this committee work and his experience with mapping that he attended the First International Congress of the International Association of Engineering Geology (IAEG) held in Paris in 1970.

Geological mapping for engineering purposes had been established for some time on the continent (Griffiths, 2002) and the IAEG had established a commission on engineering geological mapping with the intention of publishing guidelines for the subject; this was exactly what Dearman himself had in mind to do. Not one to be outdone, as Editor of the QJEG he ensured that the working party report 'The logging of rock cores for engineering purposes' was published in the December issue of the QJEG in 1970, as this addressed the problems he and his committee encountered describing rock in engineering terms for use in mapping, and spurred on the engineering group to complete and publish, in 1972, its working party report, 'The preparation of maps and plans in terms of engineering geology' (Anon., 1972).

His efforts were rewarded in a number of ways, for in 1972 he was awarded a personal Chair in Engineering Geology at Newcastle, the first such chair in the UK to the chagrin of some; the MSc in engineering geology at Newcastle, which he had designed and steered through the procedures for approval by the faculty, was started; he saw his ideas being used by others, notably by the Geological

Survey, then called the Institute of Geological Sciences (Bazley, 1971; Cratchley & Denness, 1972) and he was invited to join the advisory panel for *Géotechnique*.

Service as a panel member was a formative period in Dearman's life as over the space of three years he saw for the first time, and at close quarters within the confidentiality of the reviewer's committee, the working of soil mechanics and geotechnical engineering. The panel during 1972–74 included Professor A. W. Skempton, Dr. D. Henkel, Dr. J. Arthur, Dr. N. Simons, Mr. M. Kennard, Mr A. Little, Mr. N. Lister, Dr. R. Parry, Mr. T. Wakeling, Dr. T. Whittaker, Dr. J. B. Burland, Mr. J. McKenna, Mr. A. Muir Wood, Mr. N. Hobbs, Mr. D. Naylor, Mr. S. Thornburn and Mr. M. J. Tomlinson among its members. Many aspiring engineering geologists would have longed to share the company of this gallery of geotechnical heavyweights, all of whom appreciated the importance of ground conditions to geotechnics. The panel meetings would have focused Dearman's geological experience and perhaps it is no coincidence that this period was characterised by an outpouring of publications from him and his fellow researchers on the application of engineering geological mapping to civil engineering, illustrated well by his paper with Dr. P. Fookes (Dearman & Fookes, 1974). Further, much of what Dearman had written either under his chairmanship of the working party on mapping or later, was also incorporated into the IAEG's report of 1976, published by UNESCO (Anon., 1976).

By the time Dearman had become a Professor, the region of Tyneside had become very run-down and was the target for considerable resources for redevelopment. Dearman was quick to see that this offered unimagined opportunities for applying and developing engineering geological mapping, and in 1973 a joint project involving the Tyne and Wear Metropolitan Council and Sunderland Polytechnic was established under Dearman's leadership. This offered the prospects of pulling field and laboratory work together for the purpose of planning and redevelopment on a scale not attempted before in the UK (Dearman *et al.*, 1977).

Dearman began playing an influential role behind the scenes for the IAEG, in particular for its bulletin where he served on the editorial board from its formation in 1970, as this was the main route for literature from Eastern Europe, in particular for what were then the Russian satellites. He was also largely instrumental in assembling the IAEG report on teaching and training in engineering geology; an heroic achievement built on painstaking accumulation and compilation of incompatible data from overseas. Such service was in part recognised by the IAEG when it awarded him its Hans Cloos Medal in 1990. His contribution to engineering geology was recognised by the Geological Society a year later, with the award of the William Smith Medal in 1991. In that year he published his magnum opus, *Engineering Geological Mapping* (Dearman, 1991).

Dearman succeeded because of his desire to lead, yet under an exterior that could at times be bluff and sometimes austere, was a generous man whom countless students have good cause to thank, and a man with a sense of mischief and fun which those who worked with him will remember was exercised best when circumventing academic and institutional bureaucracy. He published 45 papers on aspects of the geology of south-west England and over 70 papers on engineering geology, plus three books (Reeves, 2008), yet despite this he must have wondered why engineering geological mapping never really caught on as it should. He was not to know then that the material descriptions needed have to be related to the environment in which they exist, especially that of stress history and stress level, or that design decisions have to be related to the scale of the

information at which they are made; these are insights that have come in recent years. Mapping for engineering geology purposes remains an unfinished study as the recent Rankine lecture (O'Rourke, 2010) illustrated; scale influences whether decisions based on maps are going to be governed by deterministic rather than probabilistic assessments. When these concepts materialise engineering geology mapping will be used again and will build upon the fundamentals that Dearman established.

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