

London, the son of a solicitor. During his school days at Guildford Grammar School his studies were mainly classical, but his interests were very wide and he distinguished himself not only as a student but also as an athlete. In 1869 he entered the School of Mines with the intention of becoming a mining engineer and had a brilliant career, winning the Murchison and De la Beche medals and the Duke of Cornwall's scholarship. He attended the lectures of Ramsay, Tyndall, and Huxley and became deeply interested in the writings of Darwin and Herbert Spencer. After completing his college course he accepted a post as private tutor and in that capacity travelled widely in North and South America. On his return, he for a time resumed his studies with Huxley, and it was by Huxley's advice that he began to turn his attention to the mental processes of animals, the subject with which his name is chiefly associated. In 1878 he was appointed lecturer in English and physical science at the Diocesan College, Rondebosch, South Africa. He returned to England to succeed Professor Sollas as lecturer and subsequently Professor of Geology and Zoology at University College, Bristol. In 1887 he succeeded William Ramsey as Principal.

His geological work was chiefly carried out during the earlier part of his time at Bristol. He contributed two papers to the *Quarterly Journal*, one "On the south-westward extension of the Clifton fault" (1885), and one "On the Pebidian rocks of St. David's" (1889), and his interest in the more philosophical aspects of geology was shown by papers in the *Geological Magazine* on "Geological Time" (1878) and on "Elevation and Subsidence" (1888). More than a dozen papers on the local geology, all based on field work, were published between 1884 and 1892 in the *Proceedings of the Bristol Naturalists' Society*. These papers added much to the knowledge of the Palæozoic rocks of the Bristol district, and the reliability of the observations has been stressed by Vaughan and by all other geologists who have had occasion to go over the ground. In 1898, when the British Association met at Bristol, he prepared an admirable account of the local geology, noteworthy, like all his writings, for its felicity of expression. He did much to encourage the study of geology by his lectures and field excursions, which were attended by many residents in Bristol in addition to the students.

Although he never lost his interest in geology and in 1901 and 1904 was joint author of papers published in the *Quarterly Journal* on the local igneous rocks, the increasing calls on his time as Principal of the University College and the development of his work on animal psychology, a subject on which he became the leading authority, gradually brought his geological work to an end.

During the latter part of his tenure of the Principalship he was greatly occupied with the negotiations which in 1910 led to the University College being replaced by the University of Bristol, of which he became the first Vice-Chancellor. After a brief tenure he resigned the Vice-Chancellorship, and the remainder of his life was chiefly devoted to his philosophical writings.

There can have been few more all-round men than Lloyd Morgan. He excelled as an investigator, a teacher, and an administrator. He was an admirable speaker with a fund of humour, a good musician, and in his younger days a keen mountaineer. The writer of this notice is deeply sensible of his good fortune in having had such a man as his chief at the outset of his career.

S. H. R.

RICHARD DIXON OLDHAM, F.R.S., died at Llandrindod Wells on July 15th, 1936, at the age of 78. He was the son of Dr. Thomas Oldham, F.R.S., the first Director of the Geological Survey of India. After his education at Rugby and the Royal School of Mines he joined that service in December 1879, a year after the death of his father and three years after the latter's retirement from the Indian Government service.

One of the first areas Oldham began to explore was the Himalayas; and it was there that the compiler of this notice first met him and spent an initiatory field season under his pleasant and long-to-be-remembered guidance. For, thus early, Oldham (following over the ground covered by Medlicott and McMahon) introduced him to some of the bewildering geological puzzles presented by the old unfossiliferous and crystalline formations of the lower hill ranges—puzzles that were to engage them both (not always very fruitfully, perhaps) for years to come, and which only recently some of the

younger members of the Survey, by their fine work, seem at last to be on the way to unravel.

It was here, too, among those elusive rocks that Oldham seized upon the one available key horizon, the Blaini boulder-bed; and, linking it up with its supposed equivalents in the Salt Range and the Talchir boulder-bed, utilized them for expounding the still rather novel idea of world-wide glacial deposits of Carboniferous age at the base of the Gondwana coalfields of India, Australia, and South Africa.

Oldham, in addition to his Himalayan work and a visit paid to Australia on the above quest, made himself acquainted during his 25 years' service with a very large part of India and its geology; his varied experience in the field ranging from Upper Burma and the Andamans, through Manipur and the Naga Hills, the Son Valley, the Outer Himalayas, western Rajputana and the Salt Range, to the Sulaiman Hills and Baluchistan.

Wherever he went there was scarcely any geological or physical question that he did not concern himself with, explore, study and report on with knowledge and keen insight. It may perhaps be said of Oldham that his work was also his hobby, though he had a curious aversion to constructing geological sections: he distrusted them! Hence, not counting his formal field reports, he examined and discussed landslips, the smooth-water anchorages of Travancore, sites for petroleum boring and artesian and other water supplies in several places, the ancient geography of India, faceted pebbles and Permian breccias, blown-sand rock sculpture, flexible sandstone, the action of flowing streams, mountain formation, river valleys and rock basins, alleged Miocene man in Burma, the Allah-Bund of Kuchh, sand hills and explosion craters and speculations concerning the history of the earth. In all he contributed over 70 papers on these subjects, not only to his own Department, but also to the Asiatic Society of Bengal, to this Society, to the *Philosophical Magazine*, the *Geological Magazine*, to *Nature*, and to other publications.

Oldham's industry and thoroughness did not end with these works. In 1888 he compiled the first *Bibliography of Indian Geology* (only to be superseded much later by La Touche's exhaustive volumes), and in 1893 he re-edited and largely rewrote the second edition of Medlicott and Blanford's *Manual*

of the *Geology of India*, for which his numerous studies of so many aspects of Indian geology in the field and his wide reading had well prepared him. This volume, after more than 40 years, still remains the official handbook of the Survey and contained when published much new matter of universal interest.

Last, but not least, Oldham, by his natural bent and mathematical ability, became a specialist in seismology. Early in his service (1882) he had edited his father's unpublished papers on the Cachar earthquake of 1869, and the *Catalogue of Indian Earthquakes* (1883). As the Great Earthquake of June 12th, 1897, occurred when Oldham was acting as Director, it fell to him to organize the investigation of results and to write the memoir (1900), which was about the most thorough examination of the subject which had until then been undertaken. Later he published a list of the after-shocks (1903), and a revision of this list was published with his account of the Cutch earthquake of 1819 (1926).

Seismology, with its bearing on speculations regarding the internal constitution of the earth, was the chief interest of the 25 years of his life after retirement. In a paper published in the *Philosophical Transactions of the Royal Society* in 1900, Oldham recognized the fact that an earthquake gives rise to two sets of deep-seated waves, condensational and distortional, in addition to surface waves, which are propagated at different speeds and along different directions, becoming apparent as the three phases observed in the traces of seismograms at distant places.

In a later paper (1906) he showed that earthquake records indicate, from the damping out of the distortional waves at great depths, that the earth has a central core, with a diameter of about two-fifths of the earth's, which differs very greatly in physical properties from those of the outer shells.

Oldham was elected a Fellow of the Geological Society in 1886, was awarded the Lyell Medal in 1908 and was President in 1920-22. He was elected a Fellow of the Royal Society in 1911, and served on its Council in 1920-21. He was elected an Honorary Fellow of the Imperial College of Science in 1931.

Oldham retired from the Geological Survey of India in May 1904, having officiated as director from May 1896 to November 1897. After his retirement he lived for a while in the Isle of

Wight near his old friend John Milne, the seismologist, and afterwards at Kew with his sister, Miss Oldham. On the death of the latter he gave up his house at Kew, and, owing to failing health (he was unfortunately a martyr to sprue), used to visit the South of France. Whilst there he made a study of the changes in the Rhône delta since Roman times, and published several papers on the subject. During the summer he lived at Llandrindod Wells, where he found a doctor who understood his case and where the climate seemed to suit him. After his last visit to France, about 1930, he must have lived there entirely.

C. S. M.

The Rev. BENJAMIN ORIEL was elected a Fellow of the Society in 1920. He was for some years the pastor of a Bath Nonconformist Church, and during that time took an active interest in the work of the Bristol Naturalists' Society. He was associated with Vaughan in the zoning of the Carboniferous rocks, but in his later years his interest was centred in river gravels and the remains of primitive man. He travelled widely in connexion with these subjects, visiting the Auvergne district of France, the Wooky Hole and other centres of interest. He wrote a paper on the gravels of the Avon which was published in the *Proceedings of the Bristol Naturalists' Society* in 1904. He became a graduate of Bristol University in 1910, and in his later years had charge of a church at Mumbles, Swansea, where he maintained his interest in geology until his death, which occurred on December 6th, 1930.

HENRY GEORGE SCOTT graduated in mining at the Royal School of Mines in 1896. In that year he went out to Siam and for 30 years had there a successful career as a mining engineer, becoming in 1927 managing director of the Siam Tin Syndicate. He was a man of exceptional charm and great ability. He was one of the foremost living authorities on the occurrence, prospecting, and development of alluvial tin properties in the East. During the last few years he had been in general consulting practice and visited Tasmania, New Zealand and various parts of the world. He was elected a Fellow of the Society in 1897 and died on February 12th, 1935.

BERNARD SMITH was the son of Alfred Smith and his wife Henrietta Bussey. Born in 1881, he was educated at King Henry VI's School, Grantham, and Sidney Sussex College, Cambridge, where he graduated in 1903 with First Class Honours in both parts of the Natural Sciences Tripos, with geology as his principal subject. As an undergraduate he coxed his College boat in the Lent races, and also got his Colours in the College Tennis VI. He was a prominent member of the Sedgwick Club, the activities of which have for many years played so important a part in the early training of the geologists of the Cambridge school. On the occasion of the twenty-fifth anniversary of the club, Smith designed a marvellous menu card showing the courtyard of the Sedgwick Museum with an iguanodon browsing on the trees and various other monsters strolling jauntily around or flying in the air. Smith's skill as an artist was considerable, though he was self-taught, and will be known to many by reason of the sketches with which a number of his papers are illustrated.

In 1904 Smith was appointed University Demonstrator in Geology and two years later was awarded the much prized Harkness Scholarship. Soon after this an investigation of the Ordovician rocks of Pomeroy, carried out in collaboration with Miss G. L. Elles and W. G. Fearnside, kindled his interest in the older Palæozoic rocks. This he never lost, and he was later able to indulge it fully in the Llangollen country. He was particularly at home in such work, demanding as it does acute powers of accurate observation and of imaginative scientific deduction.

Smith was appointed to the Geological Survey in 1906 and he worked his apprenticeship in the Triassic country of Nottingham. Later he was transferred to North Wales, and it was here that he met Miss May Ferguson, who became his wife in 1912. They had one son.

Smith took a keen interest in physiography. This led him soon after leaving Cambridge to write a text-book of *Physical Geography for Schools*, now in its third edition, in which the geological basis of physical geography was stressed. By this book and by his influence on various examining bodies, he played an important part in the movement that led to the conversion of geography from a static to a dynamic science, a movement once described by Professor Watts as the greatest