

## Obituary

Prof. W. J. Sollas, F.R.S.

IN the death on October 26, at the age of eighty-seven years, of William Johnson Sollas, the University of Oxford and the science of geology have lost an outstanding personality. To a liberal culture, especially on the scientific side, he added a wide and ever-increasing knowledge of his own subject, a genius for research which extended to all its chief branches, and a philosophical point of view which always penetrated to the deeper and more theoretical bearing of the subjects with which he dealt.

Born at Birmingham in 1849, Sollas was educated at the City of London School, where chemistry was the chief subject of his interest, and at the College of Chemistry in Oxford Street, London, where he worked in Frankland's laboratory. He passed with a scholarship to the Royal School of Mines, obtained the A.R.S.M., and finally, with two of his brilliant contemporaries, Liversidge and Garnett, obtained a scholarship at Cambridge, he and Garnett being admitted to St. John's College. Here T. G. Bonney was not only his tutor, but was also acting as deputy professor of geology in Sedgwick's declining days. His influence turned Sollas towards geology as his principal subject, and he graduated with first class honours in the Natural Sciences Tripos in 1873. He was a fellow of his college in 1882-84.

Sollas's first appointment was on the University Extension, where his lectures were most successful and bore traces of the influence of Huxley and Tyndall in their clarity and attractiveness, and of Ramsay in their imagination and enthusiasm. In 1879 he was appointed professor of geology and zoology at University College, Bristol, a post he held until 1883, when he passed to Trinity College, Dublin, as professor of geology and mineralogy. Finally, in 1897, he became professor of geology and palaeontology at Oxford, a chair he occupied until the end of his life, thirty-nine years, having been also elected a fellow of University College in 1901.

The anomalous "Cambridge Greensand", which inspired the early work of so many students of the Cambridge school, had its influence on Sollas, in the direction taken by his work on fossil sponges, on which he published more than thirty papers before 1890. This stage culminated in a new classification of the Spongida, articles in Cassel's "Natural History" and the "Encyclopædia Britannica", and a monograph on the Tetractinellidæ collected by H.M.S. *Challenger*. In his work he was interested not only in the systematic and anatomical results, but also in the physical principles involved in the development of the skeleton, and in the chemical interchanges of silica and carbonate of lime in their formation. The latter led him directly to study the origin of flint and chert, on which he evolved a theory that has stood the test of time. To help his work on minute organisms he devised a new use for heavy liquids,

arranging them in a 'diffusion column', in which the specific gravity of such bodies could be determined by the depth to which they sank. This method he later applied to minerals and rocks, and to such fluids as blood.

Sollas's palaeontological work was extended to brachiopods, echinoderms, Foraminifera, and to *Oldhamia* and its allies; he also described a new species of *Plesiosaurus* and worked out the geographical range of this genus. But perhaps his most outstanding work on organisms other than sponges was his application of the method of serial sections to the study of fossils. The ordinary zoological method was impracticable because of the intervals lost in grinding down successive slices. Sollas, therefore, worked out a mechanism and technique for grinding down specimens by stages, and, at intervals of a fraction of a millimetre, photographing and drawing in reflected light the surfaces thus obtained. Models of each section in gelatine or other medium could then be made and the organism built up at any desired magnification on successive contours, yielding a restoration of all the detail that it had preserved. A remarkable early success was obtained with *Monograptus*, and this was followed by work on a Silurian brittle-star, a Devonian fish, the skull of *Ichthyosaurus*, and, with the co-operation of his daughter Miss Igerna Sollas, a dicynodont skull. It may fairly be said that nothing has done more to advance knowledge as to the intimate anatomy, and even physiology, of extinct animals than this technique in the hands of its inventor and his successors.

When he had rounded off his sponge work, Sollas turned eagerly to petrology, and his researches on the Wicklow granite and the Carlingford complex were the most elaborate investigations undertaken up to their date. In one case he saw that the pleochroic haloes must be attributed to a new element, since identified by Joly as radium, and in the other he did much on the mixture, hybridism and metamorphism of rocks. Acting for a few years as petrographer to the Geological Survey of Ireland, he put out other work on rocks, and also assembled the evidence collected by the Survey for the issue of a map of the glacial esker system of the country. Work upon minerals was confined to a couple of papers on zinnwaldite and riebeckite, but he made a strenuous endeavour to discover the molecular structure of crystals, a subject which had awakened his interest when he first learnt at the School of Mines of Haiÿ's contributions to crystallography, and when Garnett advised him to test his early speculations by the atomic volumes. The data at his disposal were inadequate to carry him so far as X-ray investigation has taken Laue and the Braggs and their successors, but a series of papers published by the Royal Society indicates that he was on the right track.

The chief researches conducted by Sollas in later years were concerned with early man. He definitely assigned the Gibraltar skull to Neanderthal man, explored the Paviland Cave with its relics of Cro-Magnon man, dealt with *Pithecanthropus* and *Eoanthropus*, and applied the use of sagittal sections of the skull to a critical study of most of the Palaeolithic skulls that have attracted recent attention.

Wide as is the range of work thus briefly outlined, Sollas's many activities included others of which only the barest mention is possible. Such are his application of the idea of evolution in place of uniformitarianism to geological history, his study of the geology of Bristol, Dublin, Oxford, and the Silurian Inlier of Rhymney near Cardiff, his ingenious method of studying tidal movements and their effect on the estuarine sediments of the Severn, his philosophical explanation of the origin of freshwater faunas, his study of a bog-flow in Kerry, his attempt to bore through a coral reef in the Ellice Islands, afterwards carried to success by Edgeworth David and his colleagues, his addresses and books on the age of the earth and on ancient hunters in comparison with those of to-day, and the fostering care with which he watched the translation by Miss Hertha Sollas of Suess's great work "Das Antlitz der Erde", a remarkable service to British geology for which we are deeply indebted to both father and daughter.

Sollas was awarded the Bigsby Medal and the Wollaston Medal by the Geological Society, of which he became president in 1908, a Royal Medal by the Royal Society, and the Huxley Medal by the Royal Anthropological Institute. He was made an honorary fellow of the Imperial College, and received honorary doctorates from the Universities of Bristol, Dublin, Christiania and Adelaide. His death leaves, with his associates, pupils and successors, the memory of a lovable and constant friend, a gallant and doughty foe, a sprightly debater and formidable controversialist, a daring climber and diver, an omnivorous reader, a writer of clarity, vigour and humour, an investigator of untiring energy and unimpeachable accuracy, and, whether as host or guest, a genial and most courteous gentleman.

W. W. WATTS.

An anthropological correspondent writes as follows :

Although Sollas entered upon active study of the problems of early man late in life, he rapidly became an outstanding authority. His training and experience as geologist and palaeontologist inspired confidence in his balanced judgment in the discussion of chronological and morphological problems relating to early man; while his originality and constructively critical attitude of mind, which refused to be dominated by traditional methods or accepted opinion, found ample opportunity for exercise in his studies of the various types of fossil man, in which his development of the method of craniological investigation by sagittal sections showed a remarkable grasp of the morphological and metrical problems involved in comparative study.

One of Sollas's earliest archaeological investigations to attract widespread interest was his exploration of

the Aurignacian site in the Paviland cave of the Peninsula of Gower, South Wales, in which a prehistoric skeleton, known as the "Lady of Paviland", was found. Here Sollas discovered painting in red on the wall, which, notwithstanding counter-argument—to be anticipated in the circumstances—that it was the recent work of a fisherman, remains the only example of cave-painting in Great Britain for which the claim of palaeolithic age makes any showing.

Sollas published in scientific periodicals a number of papers on early man, which are of permanent value; but his most considerable contribution to the literature of the subject is—and will continue to be notwithstanding later discovery and development in method and classification—his "Ancient Hunters" (third edition, 1924). Sollas had been much impressed by the Bushman tribes he had seen in the Kalahari, when the British Association visited South Africa in 1905. The influence of that experience is to be seen in the degree to which he made use of the cultural complexes of modern hunting peoples in the interpretation of the archaeological evidence bearing upon the cultures of the hunting peoples of the Old Stone Age. As a general principle the method was not new to archaeology, but Sollas gave it scientific precision. His references to Bushman art and associated custom and belief in certain respects anticipated later studies and discovery; while in his comparisons of Magdalenian culture with that of the Eskimo he directed attention once more to matters from which interest had been diverted. It was in this connexion that he entered into one of the most strenuous controversies of his later life when he produced his study of the late Palaeolithic Chancelade skull and affirmed its affinities to that of the modern Eskimo.

We regret to announce the following deaths :

Prof. J. T. Cash, F.R.S., emeritus regius professor of materia medica in the University of Aberdeen, on November 30, aged eighty-two years.

Sir Edwin Deller, principal of the University of London since 1929, as the result of an accident, on November 30, aged fifty-three years.

Prof. E. H. Kettle, F.R.S., professor of pathology, British Postgraduate Medical School, University of London, and consulting pathologist to St. Bartholomew's Hospital, on December 1, aged fifty-four years.

Mr. W. H. Macaulay, fellow of King's College, Cambridge, author of "The Laws of Thermodynamics" and "Solid Geometry", on November 28, aged eighty-three years.

Lady Ramsay, widow of Sir William Ramsay and affectionately associated with many friends at University College, London, and other scientific circles, on November 26, aged eighty-two years.

Prof. Wilhelm Schmidt, professor of physiography in the University, and director of the Central Institute for Meteorology, Vienna, on November 27, aged fifty-four years.

Dr. Lilian Veley, an original woman fellow of the Linnean Society of London, known for her work in entomology and microscopy, on November 27, aged seventy-five years.