



W. J. Sollas

MEMORIAL TO WILLIAM JOHNSON SOLLAS

BY SIR JOHN SMITH FLETT

William Johnson Sollas, who died October 20, 1936, at the age of 87, had occupied the Chair of Geology in Oxford University with great distinction for 39 years. He was one of the most illustrious British geologists of his generation, and had been a member of the Geological Society of London for 61 years and its President in 1908-1910. In 1907 the Society awarded to him its highest distinction, the Wollaston Medal, and 44 years ago he received the Bigsby Medal, which is specially reserved for men less than 45 years of age at the date of the award. He was elected a Fellow of the Royal Society of London in 1889 and was the recipient of a Royal Medal from that Society in 1914. Among other honors which were bestowed on him, in recognition of his long and distinguished career, were the Fellowship of St. John's College, Cambridge, and of University College, Oxford; Sc.D. Cambridge; LL.D. Dublin; Ph.D. Oslo; D.Sc. Adelaide. He was an honorary member of many scientific societies and academies, and among these was the Geological Society of America, to which he was elected correspondent in 1925.

The special feature which marks the career of Sollas is the wide range of his scientific activities and the high standard which his work attained in many different fields of research. Educated at the famous City of London School, he seems to have been first attracted by the study of chemistry, though his interest in languages, literature, and the classics was inspired in his youth and continued to the close of his long career. From school he went to the College of Chemistry, an institution in which Hofmann and Frankland were the principal teachers and which produced many distinguished chemists. Thereafter, he studied at the Royal School of Mines, under Huxley, Tyndall, and Ramsay. No doubt the training he received at this early period set him on the path he was destined to follow. In 1934 the Imperial College of Science, which is now conjoined with the Royal School of Mines, recognized his eminence by appointing him an Honorary Fellow of the College. After three years of study, he passed the examinations for the Associateship of the R. S. M. and won an exhibition, and subsequently a scholarship, at St. John's College, Cambridge.

St. John's was at that time, and has continued to be, one of the most active and inspiring centers of geological teaching and research in Great

Britain. Sedgwick was Professor of Geology, but in his declining years he was assisted by Bonney, whose reputation as a geologist and petrologist stood very high. About this time, there were not a few students at St. John's who were destined to achieve a high renown in the geological world. Teall, Strahan, Marr, Clough, and several others were pupils of Bonney, and the influence of his teaching was strongly felt. Sollas had already a wide training in natural science, and he took his degree at Cambridge with all honors in 1873. To the end of his life he acknowledged gratefully the inspiration he had received from his old tutor, Bonney.

After graduation, Sollas for a time acted as a lecturer in the University Extension movement, which was very active in these years. He gave lectures on geology and kindred subjects in several towns and was soon recognized as a fascinating exponent with a wide range of knowledge and philosophical breadth of views. In 1878, he became Curator of Bristol Museum; in 1880, Professor of Geology and Zoology at University College, Bristol; and in 1883, he went to Dublin as Professor of Geology and Mineralogy. Fourteen years thereafter, he was appointed to the Chair of Geology in Oxford, in succession to A. H. Green, and he held this position for almost 40 years. In his varied course he identified himself with research on each district to which his duties took him, and he made notable contributions to our knowledge of the geology of Cambridge, Bristol, and the neighborhood of Dublin. His restless energy and acute perception provided him with subjects for investigation wherever he went.

He began writing geological papers in 1872, while still a student at St. John's. The Cambridge Upper Greensand absorbed his attention, and he investigated its petrology and its foraminifera and sponges. This led him to an extensive study of fossil sponges and the living representatives of this group. At that time the fossil sponges were little understood, and his investigations into their microscopic characters were, to a large extent, pioneer work. He described many new species and revised the classification of the group. In 1886, he published a descriptive account of the fossil tetractinellid sponges dredged by H. M. S. *Challenger*, which was followed in 1888 by a special report in the final publications of the expedition. He also wrote the article on Sponges in the ninth edition of the *Encyclopaedia Britannica* (1887). For his work on fossil sponges he was awarded in 1878 the Wollaston Fund of the Geological Society of London.

His microscopic work on fossil sponges led him to take interest in several petrological problems, such as the replacement of siliceous spicules by carbonate of lime and the history of flints. He also developed new methods and devised a specific-gravity column by which the specific gravity of minute particles or fossils, such as diatoms, could be easily and accurately determined. He further showed that, by such apparatus, the mineral components of a rock could be separated and identified, and even

organic liquids, such as blood, could in some cases have their specific gravity determined though only a single drop was available.

In Bristol, he varied his laboratory work by surveying and describing the Silurian district of Rhymney, and he also wrote a summary of the Geology of the Bristol District for the Geologists' Association; and, though his principal researches continued to be on fossil sponges, he began to write on anthropological questions, such as the bone implements of the Eskimos. Among other subjects which interested him at this time were the operations of the "dowser" or water diviner, and the origin of fresh-water faunas.

His appointment to the Chair of Geology in Dublin in 1883 provided him with new fields of work, and he enthusiastically seized the opportunities offered to him. He took up the study of Irish petrology with great vigor and marked success, and he wrote important papers on the granites of Wicklow, on the basic and acid rocks of Carlingford, and on other Irish igneous rocks. These studies showed great ingenuity and freshness of outlook and, though regarded at the time as rather heterodox, would nowadays be considered very moderate, and even conservative, in outlook. His imaginative faculty was so highly productive that he was always challenging accepted views, and his work was highly stimulating and suggestive of new developments. He also served for a time as a petrological expert to the Geological Survey of Ireland, and he published an account of the rocks of Cape Colville, New Zealand, in two volumes (1906).

His work on petrology resulted in the development of a taste for mineralogy. He published papers on riebeckite and on zinnwaldite, and went forward to a study of the minute architecture of crystals. This was a adaptation of the methods and ideas of Hauy, as he approached the subject from the standpoint of the structural arrangement of the atomic units to form crystalline solids. The recent advances in X-ray analysis of crystals have confirmed Sollas' work in several important respects, while superseding his methods and greatly extending our knowledge.

Other problems which interested him at this time were the flow of glaciers, which he imitated by models of plastic pitch, and the glacial deposits of Ireland. He prepared a map to show the distribution of Irish "eskers."

In 1893, Sollas was member of a committee to investigate the structure of coral islands, by means of borings, and for some years these problems absorbed a large part of his activities. The subject was one that awakened keen discussion and much interest was taken in it. Finally, under the auspices of the Royal Society, an expedition was sent to Funafuti under Sollas' leadership. Two borings were made which reached a depth of 106 and 72 feet, respectively. The results obtained were important but were not regarded as conclusive, and, subsequently, an Australian expedition under Professor Edgeworth David, of Sydney, successfully com-

pleted the work. Sollas' untiring energy and enthusiasm were to a large extent responsible for the prosecution of this enterprise in which he worked in close association with his old Cambridge tutor, Professor Bonney.

On his assumption of the Chair of Geology in Oxford University, Sollas again showed his remarkable power of adapting himself to his surroundings. He delivered a memorable lecture on "The Influence of Oxford on the History of Geology," and wrote descriptions of fossils in the collections exhibited in the Oxford Museum. At this period he devised methods of studying the anatomy of fossils by serial sections, obtained by grinding down the specimens and making drawings or photographs of the successive sections exposed to view. From these it was possible to construct models showing, with great accuracy, the structure of the specimen, so far as it was preserved in the stone. Some of these studies were both novel and illuminating, as, for example, the description of the problematical Old Red Sandstone fish *Palaeospondylus*. Sollas also investigated echinodermata and the skull of fossil reptiles. The method has proved exceedingly valuable and is now widely employed in the study of fossils, both vertebrates and invertebrates.

In 1905 appeared Sollas' book on the *Age of the Earth*, a collection of studies on various geological subjects, such as the earth's shape, the rate of denudation, and other kindred topics. In 1904 the first volume of the translation of Suess's *Antlitz der Erde* by Professor Sollas's daughter, Miss Hertha B. C. Sollas, edited by Professor Sollas, was issued from the press. Subsequent volumes appeared at intervals, and the work was completed in five volumes in 1924. Sollas spent an immense amount of labor on these volumes, and the translation is generally recognised as a work of the highest excellence which has done much to make the conceptions of Suess known to students in many countries of the world.

About this time, Sollas' investigations on sponges, echinodermata, reptiles, rocks, minerals, and crystals began to engage less and less of his attention and he took increasing interest in fossil man, archaeology, and Pleistocene geology, the work in which he became most widely known and which he continued to prosecute until the close of his career. In 1880, he had written on Eskimo bone implements, and in 1908, he described the Gibraltar Skull, in an important paper on the facial characters of the Neanderthal race. He introduced the method of making sagittal sections of skulls which has yielded significant results. In the Huxley Memorial Lecture in 1913, he described his researches into the Paviland Cave which contained the famous Red Lady (or Cro-Magnon man). In this work he collaborated with Professor Breuil. The associated stone implements he showed to be Aurignacian. The Chancelade Skull, also, engaged his attention, and he regarded it as similar to the skull of a modern Eskimo. In 1911, he published his book on *Ancient Hunters and their Modern*

Representatives, of which new editions were issued in 1915 and 1924. It shows Sollas at his best—acute, imaginative, full of ripe learning, and brilliant in exposition.

In his later years, Sollas was a well-known attendant at scientific congresses and meetings. A ready speaker, occasionally caustic, he made stimulating contributions to many discussions. Of medium height and spare build, he was extraordinarily active; a great walker, swimmer, and climber, though not a professed athlete. His favorite amusement was a game of chess, of which he was a skilled exponent. As a scientific worker, few have equalled him in the wide range of his investigations and the high standard which he reached in many widely different fields of study. He had wonderful powers of getting up a subject; a few months' study made him acquainted with the principles and familiar with the necessary literature. When embarked on a research, he was entirely absorbed in it, working early and late with consuming energy and concentration. His fertile brain conceived many hypotheses, and his penetrating judgment tested them in turn.

His intellectual processes were extraordinarily rapid, and the range of his knowledge was universal. Hence, his conversation was brilliant, though sometimes it was not easy to follow his reasoning. Eminently courteous and very willing to discuss and communicate his theories and discoveries, he made a most stimulating companion. He had travelled very widely and had a great knowledge of languages and literatures. There was no branch of geology of which he was not a master, yet he was perfectly free from assumption of superiority. For versatility and brilliance he was unrivalled, and we shall not look upon his like again.

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