Obituary.

DR. CHARLES HOSE.

DR. CHARLES HOSE, whose death on Nov. 14 we much regret to record, was born on Oct. 12, 1863. From his father he inherited that love of wild Nature which characterised him throughout his life. As a boy, he was a keen naturalist and continued his habit of collecting and observing while at Felsted School. In 1882 he was admitted to Jesus College, Cambridge, but did not take a degree, as in his second year his uncle, the Bishop of Singapore, Labuan, and Sarawak, obtained for him a cadetship under Rajah Sir Charles Brooke, and on April 15, 1884, he landed at Kuching and was at once sent to the Baram district, where he remained for about eighteen years. In 1904 he was appointed Resident of the Rejang district and retired on Aug. 20, 1907, when he returned to England. In 1916, Dr. Hose was appointed superintendent of the munitions factory at King's Lynn, and in 1918 was chairman of the Cotton-waste Mills Investigation Committee.

Dr. Hose was given an honorary Sc.D. at Cambridge in 1900, and was elected an honorary fellow of Jesus College in 1926. He was a member of various scientific societies and the recipient of orders from several European countries. A list of the publications by Charles Hose, compiled by Prof. G. H. F. Nuttall, is given in "Fifty Years of Romance and Research of a Jungle-Wallah at Large" (1927), in which book will also be found an enumeration of the new genera and species of animals collected by him. A perusal of the titles of the papers written by Dr. Hose or with his collaboration, and of those dealing with the specimens he collected, will give some idea of his remarkable energy and the width of his interests. The result of his labours has been to add greatly to our knowledge of the zoology of Sarawak, and all anthropologists acknowledge the unrivalled extent and value of his contributions to the ethnography of that country.

Mention should also be made of the prolonged investigations made by Hose into the cause of beriberi; he came to the conclusion that the principal cause of this disease in Borneo was the consumption of mouldy rice. It is now admitted that the disease is frequently due to a preponderant consumption of white rice, that is, rice which has been polished by the removal of the husk and outer layers which alone contain the all-important vitamins. Dr. Hose's observations and experiments provided valuable data towards the elucidation of this problem. It was also due to his persistent efforts that the wealth of Sarawak has been enormously increased by the discovery and development of the greatest petroleum-producing area, except Burma, within the bounds of the British Empire. Hose was an insatiable collector, and a large number of museums throughout the world contain zoological and ethnographical specimens and collections given by him, but he did not neglect plants and geological specimens.

When I was preparing for the Cambridge Expedition to Torres Straits, I received a most cordial invitation for my party to visit Dr. Hose in the Baram district. His offer was so tempting in its promises that I could not refuse, and the results of that visit have been far-reaching. We had the opportunity of seeing the respect and affection in which the Resident was held by the varied tribes of the district, and how they came to him with their difficulties, which were often of a personal and intimate nature. None of us will forget the wonderful gigantic peace celebration which cemented friendship between various estranged tribes and incidentally proved the power and beneficence of the Government.

We found that Hose had a very extensive and detailed knowledge of the natives, which was stored in his remarkable memory and more or less recorded in notes. He then began to collaborate with Dr. W. MacDougall, and the partnership finally resulted in the great and richly illustrated work, "The Pagan Tribes of Borneo" (2 vols., 1912), which will be a lasting memorial to Charles Hose. It was a happy combination, for though he was supreme as a collector and observer, Hose had never had a scientific training, and the method and restraint of MacDougall were of great service in bringing the great wealth of crude matter into due form.

To the last Dr. Hose retained his youthful enthusiasms and outlook; he was always seeking to know about things, and when that knowledge was obtained he utilised it in various ways. He was essentially a field naturalist, and these qualities, combined with his genial character and his sympathetic appreciation of native thought and custom, enabled him to become a notable administrator who has left an indelible impression on his beloved Sarawak.

A. C. HADDON.

PROF. RICHARD ZSIGMONDY.

SCIENCE generally has suffered a very severe loss by the recent death of Prof. Richard Zsigmondy, late Director of the Institute for Inorganic Chemistry at Göttingen. For years he has been one of the most prominent figures in the field of colloid chemistry.

Richard Zsigmondy was born in Vienna on April 1, 1865. Even as a young boy he showed great aptitude for experimental science, and he pursued the study of chemistry at the Technical High School at Vienna and at the University of Munich. After graduating for the degree of D.Phil., he became private assistant to Prof. Kundt at Berlin, and in 1893 he obtained his "Privatdozent" at the Technical High School at Graz. Four years later he was employed as scientific worker by the well-known firm of glass manufacturers, Schott of Jena. The outcome of his investigations with this firm was the preparation of a specially uniform Jena opalescent glass. After leaving the firm, Zsigmondy became a private teacher in Jena, and it was during this period that

he carried out and completed some of his most well-known investigations.

Zsigmondy's early work was concerned with glass and the colours produced by the presence of metals or metallic oxides. This led him to take up the study of colloid chemistry, and in 1898 he published his well-known work on colloidal gold. He successfully prepared gold sols of reproducible properties and showed that they owed their colour to minute particles of metallic gold, which were held in suspension by the electric charge they possessed. He further showed that removing this charge by the addition of electrolytes precipitated the gold and it was impossible to bring the precipitate back into suspension. Zsigmondy very quickly realised that the colour of his gold sols closely resembled that of gold ruby glass, and he turned his attention to this material, with the result that he definitely proved that ruby glass also owed its colour to the presence of very minute crystals of metallic gold.

Another problem which was attracting a great deal of attention at this time was the constitution of Cassius purple. Very many chemists, including Berzelius, believed that this substance was a chemical compound, but the whole question was satisfactorily solved by Zsigmondy when he synthesised the purple from colloidal gold and colloidal stannic acid. Furthermore, his method of determining the relative protective power of hydrophyllic colloids by means of the gold number is familiar to all colloid chemists.

These investigations on colloids proved that for the successful observation of these small colloidal particles more refined apparatus was necessary. Zsigmondy concentrated his energies on the solution of this problem and conceived the idea of the ultramicroscope, which, with the collaboration of Prof. Siedentopf, he brought out in 1904. This new apparatus enabled chemists to observe particles which hitherto had been invisible and it gave a new impetus to the direct study of the Brownian movement.

In 1907, Zsigmondy was called to Göttingen as Director of the Institute for Inorganic Chemistry, which he converted into a school of colloid chemistry where students from all over the world collected to study this branch of chemistry. During the early period of his stay at Göttingen, Zsigmondy turned his attention to the study of gels and gel structure, and he put forward the generally accepted capillary theory for the explanation of vapour pressure curves of silica gels as determined by van Bemmelen. His work during this period gave the study of gel structure a new interest and importance in the minds of chemists.

Later, Zsigmondy became interested in the preparation of collodion membrane filters. With characteristic thoroughness he explored the various ways and means of obtaining reproducible filters of definite and uniform pore size. This was essential if the filters were to be of any use in either colloid chemistry or bacteriology and biology. The final outcome of a period of intensive investigation and experiment was the preparation of the now widely used Zsigmondy membrane filters. These investigations were carried still further with the production of very uniform ultrafilters of varying pore size down to a diameter of about 4 $\mu\mu$. With further work he succeeded in preparing 'cella' filters for use with organic solvents. Zsigmondy was awarded the much-coveted Nobel Prize for chemistry for 1925 in recognition of his important pioneer work in the comparatively new field of colloid chemistry.

Zsigmondy made some excellent contributions to the literature on colloids in general. In 1905 his "Erkenntniss der Kolloide", containing a full account of the development of the ultramicroscope and of his original work, was published. The first edition of his general treatise on colloid chemistry appeared in 1912, and a completely rewritten edition in 1927. Another contribution, in which he collaborated with Dr. Thiessen, is "Kolloides Gold", which is one of the few standard works on the subject.

In February 1929, Zsigmondy was forced by failing health to retire from his duties at the Institute, and in October last he died at his home at Göttingen. To those who had the privilege of working under him, it was felt as a personal loss of an inspiring teacher and a sincere friend, while the whole scientific world must feel that one of its great men has passed away.

Dr. T. Wemyss Fulton.

More than fifty years ago Thomas Wemyss Fulton and I worked side by side in Turner's dissecting-room in Edinburgh, with David Bruce and Noël Paton among our comrades there. D. J. Cunningham, then senior demonstrator, was studying the anatomy of the *Challenger* marsupials; the junior demonstrator was designing the Cathcart microtome; and the laboratory attendant, 'old Stirling', the real first inventor of the microtome, was making his exquisite preparations, as Goodsir had taught him to do. A prize, of some value for those days, was given for the best dissections of the year; I have forgotten its name, but I remember that I won it one year and Fulton the next. Scholarships were few and scanty. Many of us found some employment, to help pay our way—in part or whole; and Fulton, with indomitable strength, courage, and self-denial, was a telegraphist by night in the G.P.O. and a medical student by day. He graduated with first-class honours; and when he took his M.D., three years later, his thesis was a study of 'telegraphists' cramp', based both on observation and experience.

John Murray, a good judge of men, took Fulton as one of his assistants in the task of seeing the *Challenger* Reports through the press. After a couple of years of this useful experience, Prof. Cossar Ewart brought him into the Scottish Fishery Board's service; and there he remained, afterwards becoming the Board's scientific superintendent under the Act of 1895.

Dr. Fulton's own papers began to appear in the