

PROF. H. KAMERLINGH ONNES, FOR. MEM. R.S.

PROF. HEIKE KAMERLINGH ONNES, whose death on February 21 will be widely regretted, was born on September 21, 1853, in Groningen. As a youth he attended a school in that town, of which J. M. Van Bemmelen, who later became professor at Leyden, and whose name will always be remembered in connexion with colloid chemistry, was principal.

In 1870 Onnes became a student at the University of Groningen, and from 1871 until 1873 he worked under Bunsen and Kirchhoff at Heidelberg. He remained in Groningen until 1878. His doctoral dissertation was entitled "New Considerations on the Axial Changes of the Earth," and was marked by the combination of theory and accurate experiment which is characteristic of all his later works. In 1881 he became influenced by the theories of Van der Waals and wrote an important paper in which he deduced the law of corresponding states from considerations of statistical mechanics.

In the following year Onnes became professor at Leyden. In his inaugural address he insisted that the laws of physics could be determined by accurate experiment alone. His motto "From measurement to knowledge" was then stated for the first time, and his remarks upon the necessity of the then recently designed pumps of Cailletet and Pictet for the attainment of low temperatures were almost prophetic. It was about this time that Onnes planned his cryogenic programme, which has since made his name famous throughout the world. In 1894 he published his first paper on the design and equipment of the Leyden laboratories, and in his inaugural address in 1894 he laid down the importance of accurate measurements at very low temperatures.

The formation of the cryogenic laboratory at Leyden was only made possible by the extraordinary energy and tenacity, combined with organising talents of a very high degree, which Onnes brought to bear on this subject. As a preliminary it was necessary for him to train mechanics and glass-blowers, and as a result of many years of patient work he obtained an organisation which is still unique. In 1904 Onnes was able to control large supplies of liquid air. By 1906 he had developed the technique of the liquefaction of hydrogen on a large scale. In 1908 he attained the triumph of his career by liquefying helium. This feat, taking into

consideration the limited supplies of helium and the difficulty in obtaining it in those days, was little short of superhuman.

The amount of careful organisation and planning necessary before the experiments were started can only be appreciated by those who have seen the laboratory in action. It is worthy of record that the whole staff was so tired out by their exertions that they could not see the helium even after it was liquefied. The presence of the liquid was pointed out to them by Prof. F. A. H. Schreinermakers, who was in the laboratory at the time.

The boiling-point of helium enabled Onnes to reach a temperature only 4.22° above absolute zero. By reducing the pressure he was finally enabled to arrive

at a temperature of 0.9° absolute. The writer had the privilege of seeing Onnes attempt to solidify helium. A battery of fifteen large Langmuir pumps were put into connexion with a supply of liquid helium whereby the pressure was reduced to about 0.2 mm.; in spite of this, however, the helium did not solidify.

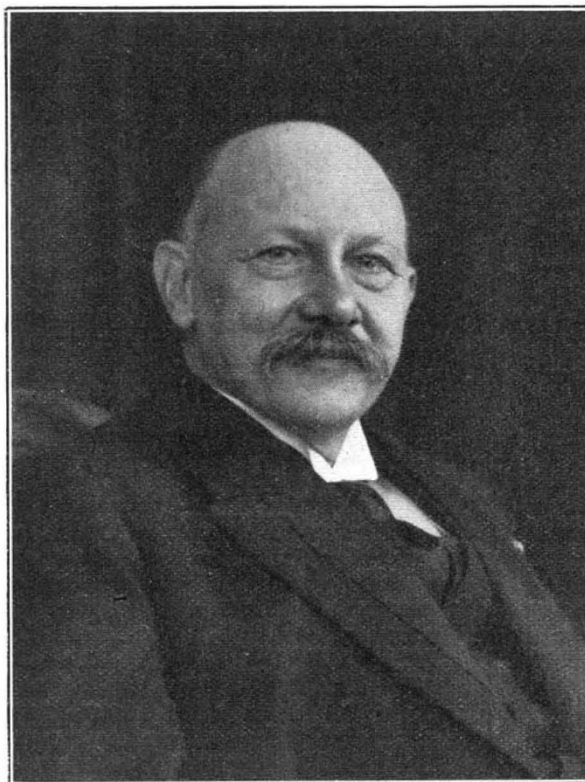
The ability to control really low temperatures enabled Onnes to make the astonishing discovery of supra-conductivity. It had always been assumed that the conductivity of a metal would run out to nil at the absolute zero. Onnes discovered that quite a number of substances showed a sharp discontinuity in their conductivity curves at a temperature of about 4° or 5° absolute. Typical examples are lead and cadmium. He passed a current of 1000 am./sq.mm. through a

conductor under these conditions without being able to detect the slightest change of E.M.F.

Onnes's work is well summarised in the volume presented to him on the occasion of the fortieth anniversary of his holding the chair at the University of Leyden. Most of his work was published in the *Proceedings of the Physical Laboratory of Leyden*, and it is due to the comparative inaccessibility of this publication that Onnes's work is not so widely known as it should be.

It is impossible, within the limits of a brief notice, to give more than an idea of the scope and range of his activities. The division of the above-mentioned work into thermodynamic, magnetic, optical, magneto-optical, radioactive and electric sub-sections, in each of which he published numerous papers, is an indication of the magnitude of his work.

In later life Onnes received the fullest recognition



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of his great talents. His own country awarded him a Commandership in the Order of the Lion of the Netherlands. Similar decorations were conferred upon him by the Governments of Poland and Norway. In 1913 he received a Nobel Prize for physics. He was an honorary member of practically every learned society in the world. Onnes was awarded the Rumford medal of the Royal Society in 1912 and was elected a foreign member of the Society in 1916.

Turning to his personal side, it is impossible to speak of him without emotion. Onnes was one of the most genial, kind-hearted, and accessible men who ever lived. He made unremitting efforts towards the feeding of children in the destitute areas of Europe in the years immediately following the War. To young men, he was an inspiration. The writer will always remember, with gratitude, his extraordinary kindness and hospitality. He practically kept 'open house.'

Onnes's scientific memory is imperishable, and his personality will never be forgotten by any one who had the privilege of knowing him.

F. A. FREETH.

PROF. F. Y. EDGEWORTH.

By the death of Prof. Francis Ysidro Edgeworth fellow of All Souls College and emeritus professor of political economy at Oxford, on February 13, at eighty-one years of age, economists and statisticians alike have suffered a heavy loss. Born at Edgeworthstown, Ireland, in 1845, he was educated at Trinity College, Dublin, and Balliol College, Oxford, and was called to the Bar in 1877. Always a man of the widest interests—classic, mathematician, and philosopher—he was some time in finding his *métier*. Ethics and logic first gave scope to his abilities, but with his appointment as Tooke professor of political economy at King's College, London, in 1890, and his migration to Oxford as Drummond professor in 1891, the trend of his life's work was fixed.

On the foundation of the Royal Economic Society in 1890, Edgeworth became editor of its organ, the *Economic Journal*, and but for one short interval remained co-editor until his death. His early volume, "Mathematical Psychics" (Kegan Paul, 1881), dealing with the application of mathematical methods to economics, is in many ways very characteristic, not only in subject but also in style; in the fact that nearly half the small volume consists of appendices, as many of his later papers bristle with footnotes, and in the adornment of the text by quotations from the Greek. Olympian Zeus, Here, and Athena are but rare visitors to the pages of most economists! His numerous economic writings, for the most part on abstract theory and covering a very wide field, were recently reprinted by the Society in three handsome volumes (Macmillan and Co., 1925), and well exhibit the detached and acutely analytical character of his mind. A fellow of the Royal Statistical Society since 1883, he was awarded the Guy gold medal of the Society in 1907, and in 1912-14 held the office of president.

In statistics, Edgeworth's work was mostly concerned with the theory of error, averages, the normal distribution and its generalisations, and—as mundane a subject as perhaps he cared to touch—index-numbers. He was secretary of the British Association Committee "ap-

pointed for the purpose of investigating the best methods of ascertaining and measuring variations in the value of the monetary standard" and responsible for its classical reports (1887-90). The subjects chosen for his two presidential addresses to the Royal Statistical Society, "On the Use of the Theory of Probabilities in Statistics relating to Society" (1912) and "On the Use of Analytical Geometry to represent Certain Kinds of Statistics" (1913), show the bent of his mind. From the first paper he contributed to the very last—a note on "The Element of Probability in Index-numbers" in the *Journal of the Royal Statistical Society* for last July—all exhibit his lively but distinctly difficult style, leaping from one illustration to another: fluctuations of sampling in human statistics elucidated indifferently by counts he had made of the numbers of wasps entering and leaving a nest, or the numbers of dactyls in Virgilian hexameters. Young to the last, in spite of his years, courteous, humorous, and kindly, he will be greatly missed.

REV. S. J. WHITMEE.

THE Rev. Samuel James Whitmee, who died in London on December 10, was born at Stagsden, Bedfordshire, in 1838, and went to Samoa on behalf of the London Missionary Society in 1863, where he remained until 1877. During this period he contributed many notes to NATURE, including "Earthquakes in the Samoan Islands, South Pacific," "Origin of Cyclones," "Meteors in South Pacific," "Fauna and Flora of New Guinea and the Pacific Islands," and in vol. 12 (1875) a criticism of Prof. Dana's review of Darwin's "Coral Reefs," entitled "Mr. Darwin and Prof. Dana on the Influence of Volcanic Action in preventing the Growth of Corals." His other publication included a list of Samoan birds in *Ibis*, vol. 5; "On the Manifestation of Anger, Fear and other Passions in Fishes" in the *Proceedings of the Zoological Society* for 1878; and a paper on "The Ethnology of the Pacific" in the *Victoria Institute Journal*, vol. 14 (1881).

Mr. Whitmee collected and forwarded to Kew numerous botanical specimens, the ferns of which formed the subject of two papers by Dr. J. G. Baker in the *Journal of Botany* for 1876, in which fourteen new species were described. His other natural history specimens were sent to the British Museum.

Returning to England in 1877, Mr. Whitmee engaged in ministerial work, but returned to Samoa in 1891, where he became the close friend of R. L. Stevenson, to whom he taught the Samoan language. Whitmee finally returned to England in 1894 and settled down at Barnet.

C. H. W.

WE regret to announce the following deaths:

Prof. A. R. Cushny, F.R.S., professor of materia medica and pharmacology in the University of Edinburgh, on February 25, aged sixty years.

Prof. F. Roth, emeritus professor of forestry in the University of Michigan, known for his work on the technical properties of timber, on December 4, aged sixty-seven years.

Mr. W. F. Wells, president in 1911 of the British Pharmaceutical Conference and twice president of the Pharmaceutical Society of Ireland, on January 28, aged seventy-six years.