Rothentree, 15.11.15

THE NOBEL PRIZE

WON BY PROFESSOR BRAGG AND HIS SON.

X-RAYS AND CRYSTALS.

STOCKHOLM, November 13.

Professor W. H. Bragg, F.R.S., formerly Professor of Physics at Adelaide University, and Mr. W. L. Bragg, M.A., Fellow of Trinity College, Cambridge, will divide between them the Nobel Prize for Physics. The award has been made to them in recognition of their researches in regard to the X-rays and the examination by their means of the formation of crystals.

The Nobel prizes were established by the late Alfred Bernhard Nobel, the Swedish chemist and engineer, who died in 1896. From the manufacture of dynamite and other explosives, and from the exploitation of the Baku oilfields, he amassed an immense fortune. The bulk of this he left in trust for the establishment of five prizes, each worth several thousand pounds, to be awarded annually, without distinction of nationality. The first three of these prizes are for eminence

Professor W. H. Bragg, F.R.S.

in physical science, in chemistry, and in medical science or physiology. The fourth is for the most remarkable literary work, dans le sens d' idealisme. The fifth is to be given to the person or society that renders the greatest service to the cause of international brotherhood in the suppression or reduction of standing armies, or in the establishment or furtherance of peace congresses.

Professor Bragg, who is a Fellow of the Royal Society, a Master of Arts, and a Doctor of Science, recently exchanged his position as Cavendish Professor of Physics at Leeds University for a similar office in connection with the University of London. For many years he has been engaged in researches on the subject of radio-activity, and before he left the Adelaide University he had earned a world-wide reputation by his discoveries in this realm of science. When he went to Leeds in 1908, Professor Bragg continued his work in the same sphere. His son, Mr. W. L. Bragg, who had previously studied under his father, after a brilliant course at Trinity College, Cambridge, of which great centre of learning he is a Fellow, threw himself into the business of research in conjunction with his father. This year they caused a sensation in the scientific world by the publication of a paper on "X-ray and Crystal Structure," for which they were awarded the Barnard Medal by the Columbia University, New York. Sir Ernest Rutherford, a New Zealander, who is now Longworthy Professor of Physics at Manchester, was awarded the Barnard Medal in 1910, and the Nobel Prize for chemistry two years earlier.

Professor Bragg's scientific researches covered a wide range while he was in Adelaide, but his chief work here was done in connection with what are known as the alpha rays emitted by radium and other radio-active substances. Such substances emit three types of radiation, but it is the alpha rays that are the cause of the remarkable phenomena of the continuous production of heat and phosphorescence that first drew attention to radio-active bodies. Before his experiments very little was known of their properties except that they consisted of positively charged particles, probably atoms of

Mr. W. L. Bragg, M.A.

helium, projected with great speed and yet incapable of penetrating more than the thinnest solid films or an inch or two of air. His work brought precision into the subject, and consequently led to the enunciation of definite laws. He showed (1) that the alpha particle practically moved in a straight line from the beginning to the end of its course; (2) that all the particles ejected by one radio-active substance moved with the same speed; (3) that all, therefore, drove the same distance through the air, a distance which he named the "range" of the particle; (4) that the various radio-active substances differed from one another in the ranges of their particles; (5) that the alpha particles of the various substances differed in nothing else but range; (6) that an alpha particle in driving through an atom experienced a loss of speed, and consequently of range, which was very nearly proportional to the square root of the atomic weight; (7) that the effect of an atom was unaffected by its incorporation into a molecule, or by the pressure or temperature of the gas of which it formed a part.

These definite results formed the basis of much investigation in various parts of the world. In their light Sir Ernest Rutherford at once improved his famous experiment on the weight and charge of the alpha particle, and attained accuracy and finality. The fact that each radio active substance emitted particles of definite range proved a powerful means of detection and analysis, and led to the discovery of new radio-active substances, and therefore of new elements, and assisted in the determination of the "pedigree" or order of transmutation of the radio-active atoms. The results are also used, directly or indirectly, in many determinations of radio-active quantities, and, through them, of ordinary physical constants of first importance. It was mainly this work that won for Professor Bragg the coveted F.R.S. in 1907. Another piece of work was the determination of the number of electrons set free in various gases by the alpha particles. He showed the existence of a curious effect which he called "initial recombination," examined its laws, and carried out various minor pieces of research work dealing with this subject. Other investigations conducted by him in Adelaide related to the properties of the beta and gamma rays of radium and the Rontgen rays. According to the orthodox theory of the nature of the gamma and Rontgen rays, they consist of pulses in the ether (as was first suggested by Sir George Stokes). But two years before he left Adelaide, Professor Bragg was led to suggest an alternative theory, that these rays might be of a material nature, electrically neutral, the alpha rays being positive and the beta negative. His experiments have strongly supported the material theory, inasmuch as they have confirmed some remarkable conclusions which that theory had predicted. The matter was of very great interest, since any modification of the older pulse theory made to meet the new facts, led to quite a novel conception of the properties of the space-filling ether. It was necessary to give it a structure, say, of a fibrous character; and this greatly altered our conceptions of the nature and means of propagation of light. The consequence was that Professor Bragg's material theory provoked quite an unusual amount of discussion in scientific circles.

Professor Bragg, who married a daughter of the late Sir Charles Todd in 1889, is still a comparatively young man, for he was born on July 2, 1862. He was third wrangler at Cambridge at the age of 22, and two years later was appointed professor at Adelaide University, where he remained for 22 years. Mr. W. L. Bragg is about 25 years of age. He had a most distinguished career at St. Peter's College, at Adelaide University, and at Trinity College, Cambridge, where he won the highest possible honors in mathematics and obtained a fellowship. He is now engaged in special scientific work on behalf of the War Office in France and Flanders. Professor Bragg's second son, Lieutenant R. Bragg, was killed in action on Gallipoli Peninsula early in September.

A SCIENTIFIC TRIUMPH.

The Chancellor of the University (Sir Samuel Way, Bart.), when interviewed by a representative of "The Advertiser," said:—"This is the culmination of a long succession of scientific triumphs which Professor Bragg has achieved with his researches into radio-activity, which were carried on for years in the University of Adelaide. The prize is all the more precious to him no doubt because his son has been associated with him in these remarkable achievements."