should be appointed secretary and educational adviser to the London County Council Technical Education Board in 1893. In this position, he probably achieved his most important work. He was largely responsible for the development of the London polytechnics and worked in harmony with both the City Parochial Charity Trustees and the great City companies. When the old Technical Education Committee was superseded by the London County Council Education Committee, Dr. Garnett was appointed educational adviser, and although this position relieved him of the responsibility of much educational routine, he exercised a great influence.

Dr. Garnett had a personality which was felt by all who were brought in contact with him. In his presence, none could fail to realise that they were dealing with a man of force of character, ideals and originality. He had, moreover, the power of inspiring devotion in those with whom he was associated. J. L. S. H.

WE regret to announce the following deaths:

Prof. U. S. Grant, professor and head of the Department of Geology and Geography at Northwestern University, Evanston, Illinois, who has done much work in economic and petrographic geology, on September 21, aged sixty-five years.

Prof. A. B. Hill, emeritus professor of hygiene and public health at the University of Birmingham, president of the Society of Medical Officers of Health in 1911–12 and of the Association of County Medical Officers in 1917–1924, a leading authority on national public health, on November 5, aged seventy-eight years.

News and Views

Royal Society Medallists

HIS MAJESTY THE KING has approved of the following awards this year by the President and Council of the Royal Society in respect of the two Royal Medals: A Royal Medal to Prof. R. Robinson, for his distinguished work in organic chemistry; A Royal Medal to Prof. E. Mellanby, for his distinguished work on dietary factors, especially in connexion with rickets. The following awards of medals have also been made by the President and Council: Copley Medal to Dr. G. E. Hale for his distinguished work on the magnetic field of the sun; Rumford Medal to Prof. F. Haber for his distinguished work in the application of thermodynamics to chemical reactions; Davy Medal to Prof. R. Willstätter for his distinguished researches in organic chemistry; Darwin Medal to Dr. C. E. Correns for his distinguished researches in genetics; Buchanan Medal to Prof. T. Madsen for his distinguished theoretical and practical work on immunity, especially in relation to diphtheria antitoxin; Hughes Medal to Dr. J. Chadwick for his distinguished researches on radioactivity.

Barnaba Oriani, 1752–1832

THE centenary falls on November 12 of the death of the eminent Italian astronomer, Barnaba Oriani, who for many years was director of the Milan Observatory, and to whom Piazzi communicated his discovery of the minor planet Ceres. Piazzi first observed the planet on January 1, 1801, and a few weeks later he wrote to Oriani and Bode, the former of whom calculated its orbit. Oriani was born near Milan on July 17, 1752, and was educated by the Barnabites. He was made a priest at the age of twenty-three years and almost immediately entered the Observatory, which had not long since been founded at the College of Brera, Milan. He soon attained a recognised place among Italian astronomers and was among the first to publish tables of the planet Uranus, discovered by Herschel. In 1786 he was sent to London to obtain instruments from Ramsden. At this time he became acquainted with Herschel, with whom he afterwards corresponded. With his colleagues, Francesco Reggio (1743–1804) and Angelo Cesaris (1750–1832), he carried out geodetical operations in northern Italy. He published various works on the motion of the planets. Although, during the greater part of Oriani's life Milan formed a part of the Austrian dominions, it was seized by the French in 1796, and in 1802, the year in which Oriani was made director of the Observatory, it became the capital of the Cisalpine republic, with Napoleon as first president. On this occasion, it is said, that on Oriani's refusing to take the oath swearing hatred against monarchy, the wording of the oath was accordingly altered for him. Oriani's successors at Milan have included Carlini, Schiaparelli and Celoria.

Atomic Projectiles

ATOMIC projectiles and their applications formed the subject of the nineteenth Thomas Hawksley lecture delivered by Lord Rutherford on November 4 before the Institution of Mechanical Engineers. At present the maximum velocity that can be communicated to matter in bulk is not more than two miles a second. This is of the same order of magnitude as the average speed of the molecules of gases under ordinary conditions. But if we turn to individual charged atoms, methods have been developed which enable us to produce atomic projectiles moving with enormous speed. When the velocity becomes comparable with that of light, we have to take into account the change of mass of the particle with speed. As the velocity is generally produced by the acceleration of the particle in an electric field, it is convenient to speak of a thousand-volt particle, meaning thereby that the particle has the speed and energy equal to that gained in passing freely between two points differing in potential by a thousand volts. In the experiments of Cockcroft and Walton in the Cavendish Laboratory, Cambridge, a steady difference of potential up to 600,000 volts can be

maintained in the accelerating tube, thus producing a stream of swift protons corresponding to a current of 20 micro-amperes. By the multiple acceleration of charged atoms, Lawrence and Livingston in California have been able to obtain a stream of protons of energy so high as 1,200,000 volts by the use of a voltage so low as 4,000 volts.

Effects of Atomic Bombardment

IN the second part of his address, Lord Rutherford described the applications of atomic projectiles. After considering the way in which swift α-particles from radioactive substances have been used for throwing light on the dimensions of the atomic nucleus, he gave an interesting account of experiments on the transmutation of matter. This has been effected by the bombardment of matter by swift atomic projectiles of different kinds. In 1919, Rutherford was able to demonstrate the disintegration of the nitrogen nucleus as a result of a close collision with an α-particle in which a swift proton was expelled. The discovery of the 'neutron' followed upon experiments by Bothe, who observed a very penetrating type of radiation when beryllium was bombarded by α-particles. Chadwick carried out further experiments by counting methods, and concluded that the radiation consists of a flight of material particles which are supposed to be close combinations of a proton and an electron. Within the last year, Cockcroft and Walton have obtained definite evidence that certain atoms can be transformed by a stream of fast protons produced artificially in a discharge tube. This new method of attack, so successfully begun, is certain to give us much new information on the structure of nuclei and the problem of the transmutation of the elements.

Egypt and the Nile

THE presidential address delivered by Sir Murdoch Macdonald to the Institution of Civil Engineers at the first meeting of the session on November 1 was almost entirely devoted to a consideration of the engineering development of Egypt and the Sudan, with which his life work has been closely associated, and, in particular, to the measures taken to bring into cultivation vast areas of waste land which have lain unproductive for centuries. Of the 360,000 square miles over which the King of Egypt rules, 95 per cent is desert. The combined area of the two cultivated districts of Lower and Upper Egypt is only about 12,000 square miles, one tenth of the area of Great Britain and Ireland; and the narrow strip of cultivated land, running for some 550 miles on each side of the Nile from Cairo to Assuan, has an average width of not more than 6 miles. Referring to the geological history of the country, Sir Murdoch said that, on the supposition that the Delta of the Nile lay in an ancient bay of the Mediterranean now filled with silt, the original mouth of the river was at Cairo. The depth of silt and sand in that locality indicates that the river once ran at a much lower level than it does now. From records of water levels on the Roda gauge, near Cairo, extending over many hundred years, it has been deduced that the bed of the river and the general level of the cultivable land must have been raised at the rate of 1 mm. a year and the process has been going on probably for 20,000 years.

Irrigation Schemes in Egypt and the Sudan

AFTER alluding to ancient indigenous methods of providing water for crops, Sir Murdoch Macdonald proceeded to discuss the modern system of perennial irrigation (under which provision has also to be made for drainage) adopted in consequence of the introduction of cotton cultivation by the Khedive, Mohammed Ali. The first work of construction in that connexion was the Delta Barrage, completed in 1861, but, owing to defects in the foundations, not brought into effective use until the British occupation, when the works were strengthened. The succeeding structures of the same type at Assuan, Asyut, Esna and Nag Hammadi were historically noticed, and then reference was made to various schemes put forward from time to time for impounding the water of the Blue Nile and the White Nile above Khartoum. Figures were quoted to show the benefit to Egypt of the Assuan Dam. The 1,000 million cubic metres of water originally impounded would be increased by the re-heightening to at least 4,800 million cubic metres and the normal summer supply would be increased by about 66 per cent. The contemplated Gebel Aulia reservoir would contain about 3,000 million cubic metres and would possibly be able to pass 2,500 million into the river. A Lake Albert Dam, only 8 metres in height, would impound about 40,000 million cubic metres, but would require to be coupled with works which would conserve the waters as they passed down the river and prevent their being wasted as at present in the Sudd region. Sir Murdoch touched upon the schemes put forward for preventing the immense loss of water due to evaporation from the marsh formed by the main stream between the Sobat and Bahr-el-Ghazal. The whole territory including the marsh region has an area of about 90,000 square miles and might become a wonderful timber growing country. Summing up the position between Egypt and the Anglo-Egyptian Sudan, he said that the large volumes of water passing in flood, of which Egypt can only use a small part, would make it possible for the Sudan to divert a great quantity without detriment to her neighbour. All the conceivable diminution by future reservoirs would not be sufficient to reduce the flood volume below the known requirements of Egypt for the fertilisation of its flood crops.

Telephony and Telegraphy in Great Britain

SIR THOMAS PURVES, engineer to the Post Office, contributes to the British Industries Number forming a supplement to the *Times* of November 1 an interesting article on the industries connected with telegraphy and telephony. In the earlier days of telegraphy, Great Britain was pre-eminent in the manufacture of high quality Morse and Wheatstone automatic apparatus. The very fact of the excellence