Laboratory became vacant in 1919, he was called to fill Glazebrook's place. The new responsibility was one which might well have daunted many men; but Petavel brought to bear all his experience and great natural powers, and has left behind him a record of devoted and successful direction which will be long remembered. He fully maintained the high traditions set by his predecessor, and under his guidance the Laboratory steadily enhanced its influence and prestige. The staff grew to nearly seven hundred strong, and the former grounds of Bushy House were expanded from twenty-three to some fifty acres, so that adequate provision was made for future extensions of the work of the Laboratory to meet the ever-increasing demands of industry.

Petavel was a man of tenacious views and had a highly-developed critical faculty which stood him in good stead, and which he was accustomed to apply to everything that came before him whether significant or trivial. Few men can have had so fine an eye for detail, whether as the courteous and charming host or as the head of a great Laboratory for which he slaved unremittingly, working long hours into the night. At all times, the Laboratory came first and foremost in his thoughts, and nothing was too unimportant to escape his attention among the vast ramifications of interests with which he had to deal. He always emphasised the paramount importance of ensuring the high national and international authority of a National Physical Laboratory test or investigation: the accuracy must be unquestionable. His memory was encyclopædic, accurate and long-lived, and he kept himself singularly well informed of the progress of the almost countless developments in the various departments of the Laboratory. He possessed the faculty of trenchant comment, and would infallibly diagnose the strength and the weaknesses of a scientific report or paper. He had a liking for the parable and the metaphor in speech, often combined with a turn of whimsical humour. His staff came to realise his faculty for wise counsel, and even when it was unpalatable the recipient found it tempered by the kindly smile which accompanied it.

Petavel could always be relied upon to make major and constructive contributions to the manifold problems connected with the design and layout of new and unique equipment or buildings, the erection of which went on almost unceasingly during his directorship. Among these were individual laboratories for research in high voltages, physics, acoustics and photometry, a compressed air tunnel for aerodynamical research, further wind tunnels of the open-jet type and an additional tank for testing ship models.

Petavel was made a K.B.E. in 1920, a fellow of the Royal Society in 1907, and a member of the Athenæum under Rule II in 1920. He presided over Section G (Engineering) of the British Association in 1919. His duties on Government and other committees were exceptionally heavy. Among them were numerous boards and committees of the Department of Scientific and Industrial Research, the British Electrical and Allied Industries Research Association, and the British Standards Institution. He was, or had been, a member of the National Radium Commission, the Board of Visitors of the Royal Observatory, Greenwich, and of the Engineering Board of Studies of the University of London.

Sir Joseph commonly gratified his taste for wide travel during vacations, but at home two great delights occupied his private life—Bushy House and its garden. Bushy House, the former royal residence of Queen Adelaide, which since the foundation of the Laboratory has served as the director's residence, he lovingly adorned with period furniture and transformed into a house of beauty and refinement. He gave like attention to the 200-year-old garden, which he largely remodelled, and to the grounds of the Laboratory, which he constantly sought to beautify. Each spring tens of thousands of daffodils have given delight to his visitors and staff and they will long serve as beautiful if poignant reminders of him who gave them being.

Nothing pleased Sir Joseph more than to share his house and garden with his guests, and there are very many who will treasure happy recollections of his overflowing hospitality and the spirit which prompted him to cheer his parting guests with large bunches of flowers lavishly culled from his garden. He greatly interested himself in the welfare and social activities of the staff of the Laboratory, by whom the sense of profound personal loss occasioned by his early death is felt acutely and universally from top to bottom. Many of them cherish tokens of his kindness and friendship.

Sir Joseph, who was unmarried, showed great and characteristic fortitude to the last in his painful illness. He was interred at Highgate Cemetery on April 4. A memorial service was also held at Hampton Parish Church at which the president of the Royal Society, Sir William Bragg, paid a touching and eloquent tribute to Sir Joseph's life and work.

G. W. C. KAYE.

Sir Frederick Norman

SIR FREDERICK NORMAN, who died on March 17 at Runcorn, was one of those pioneers of applied science whose life was devoted to his work and to local affairs. He was difficult to know intimately: always pleasant, well-informed and interesting, he was a man of high character and had very great local influence, particularly as a Cheshire magistrate and as chairman of the Runcorn Bench. He suffered a severe loss at the end of the Great War in the death of his only child, Stanley, a young chemist of very great promise. He was a man of great generosity to local institutions and lent a helpful hand to very many in all stations of life.

Norman, who was born on February 18, 1857, began at Wiggs Brothers' works at Runcorn, which later became part of the United Alkali Co., and he was always in command of the works on the Cheshire side of the River Mersey, which he advocated as the finest site in the world for the production of heavy chemicals. The main development of the United Alkali Co. was then on the Lancashire side, the salt, which is the basis of this industry, being in Cheshire.

It is worthy of note that the original works of Gossage and others were put on waste ground at Widnes, so that the escaping acid fumes did least harm under the prevailing wind conditions to the neighbours.

Time has already largely proved that Norman was right. His early work was concerned with the recovery of copper and precious metals from burnt ore, and he devised a process for the production of a red oxide of iron pigment from the spent liquors, which was worked successfully for many years by the Liverpool and Hull Red Oxide Company.

Norman's interest in metals continued throughout his life, and he was in close contact with leading men at home and abroad on developments in the metallurgy of iron, copper, zinc, etc. In copper recovery he early recognised the merits of the Ramén mechanical furnace, and continually studied other aspects of copper recovery until post-War developments at home and abroad reduced to small dimension in England what had been a large and profitable business.

It was at Wigg Works that the Raschen process for cyanide manufacture was successfully operated for some years from 1898 on until, like other processes of the period, it had to yield place to the Castner method of starting from metallic sodium. The Raschen process was based on the oxidation of sodium sulphocyanide by air, using nitric acid as an intermediary in the oxidising vessels and regenerating this in towers from the liberated nitric oxide. Such production of nitric acid from nitrogen oxides is now carried out on an immense scale in the present-day methods of nitric acid manufacture. Prior to 1900 it was difficult, more especially in construction and design of plant and choice of material. It may be recalled that an accident on the Wigg plant demonstrated the violently explosive character of the endothermic nitric oxide—a property then barely known, but one which had to be guarded against.

In 1928, Sir Frederick gave up his position as manager of the United Alkali Company, after fifty-seven years' service, to become consultant on non-ferrous metals for Imperial Chemical Industries, Ltd. He was knighted in 1914 and for his services during the Great War made a deputy lieutenant of Cheshire.

Prof. F. B. Jevons

WE regret to record the death of Prof. F. B. Jevons, formerly professor of philosophy and a vice-chancellor of the University of Durham, which took place on February 29 at the age of seventy-seven years.

Frank Byron Jevons, second son of John William Jevons of Doncaster, was born on September 9, 1858. He was a scholar of Wadham College, Oxford, taking first class honours in Classical Moderations and in Literæ Humaniores. In 1882 he was appointed to the staff of the University of Durham, where he spent the whole of his academic career, being classical tutor in 1882–1910 and professor of philosophy in 1910–30. He held a number of high offices in the University, and was vice-chancellor in 1910–11.

In his early work as a classical scholar, Jevons already showed, notably in "The Prehistoric Antiquities of the Aryan People", in his edition of Plutarch's "Roman Questions" and in his "Manual of Greek Antiquities", that his bent lay not so much in the direction of pure scholarship as in the study of the development of the religious and philosophical conceptions of the peoples of antiquity. A "History of Religion", which had already reached its seventh edition in 1896, traced the origin of religion to totemism, and established Jevons, in company with such men as Robertson Smith and Andrew Lang, as one of the protagonists in the discussions on the origin and development of religious ideas, which were a marked feature of anthropological thought at that time. His "Idea of God in Early Religion" appeared in 1910, and he was also the author, among other works, of "Religion in Evolution" and "A Study of Comparative Religion". Although recently, the diversion of anthropological studies to other methods of approach has somewhat obscured his contribution to humanistic studies, his work is of enduring value, his profound knowledge of the conceptions of antiquity compensating in some degree for his lack of first-hand knowledge of the ideas of primitive people—a lack which, indeed, he shared with the more prominent of the controversialists who were his contemporaries.

BOHEMIAN palæontology has suffered a great loss by the death of Prof. C. Klouček on October 11, 1935. He was born in 1855 and began life as a sculptor. In 1903, when more than fifty years of age, he started collecting fossils from nodules and stones on the land in the neighbourhoods of Rokycany and Prague. In these (Lower Ordovician $D\gamma$) he found many new species of trilobites and other forms of life. He likewise proved that the Osek-Kváň series of Ordovician age represented two distinct faunistic horizons. But his greatest discovery came from his study of the Tremadocian, which he began in 1913. Before his day, these beds were little known, so that he can be regarded as the discoverer of the Tremadocian in Czechoslovakia. He did very important work in the stratigraphy of these beds, dividing them into various horizons, according to the type fossils.

WE regret to announce the following deaths:

Prof. Robert Barany, of the University of Uppsala, who was awarded the Nobel Prize in medicine in 1914 for his work on the physiology and pathology of the ear, on April 8, aged fifty-nine years.

Major W. H. D. Clark, O.B.E., sometime chief examiner and later Assistant Comptroller of the Patent Office, on April 9, aged seventy-six years.

The Hon. Stephen Coleridge, director of the Anti-Vivisection Society and formerly president of the League for the Prohibition of Cruel Sports, on April 10, aged eighty-one years.