other streams rise in the chalk and are therefore heavily impregnated with lime, but curiously enough the nodules are much less developed in them than in the Bourne Brook, which flows over gravels, clays and the greensand, west of the chalk escarpment. This suggests that factors other than lime content of the water may also be important. It is noteworthy that the Bourne Brook is more apt to become fouled with organic matter from agricultural land than the other streams.

The chief apparent difference between the Bourne Brook and Little Conestoga nodules rests in the Algæ recorded from them. Roddy attributes the precipitation of calcium carbonate to a number of blue-green Algæ and records *Gloeocapsa*, *Gloeothece*, *Aphanocapsa*, *Nostoc*, *Oscillatoria* and *Rivularia*, but not *Phormidium*. It would be of interest to know whether, in spite of the physical similarity, the nodules are produced by different genera of Algæ in the only two cases on record.

[1] Fritsch, F. E., "Structure and Reproduction of the Algæ", **2**, 868 (1945).

[2] Roddy, H. J., *Proc. Amer. Phil. Soc.*, **54**, 246 (1915).

OBITUARIES

Prof. J. Lloyd Williams

Emeritus Professor John Lloyd Williams, of Aberystwyth, died on November 15, 1945. A native of Llanrwst, he entered the Normal College, Bangor, to prepare himself for a teaching career. An inveterate reader, a patient observer of Nature and her ways, a true lover of the open air, he was one of a group of distinguished North Wales botanists of his time, and contemporary with Dr. Trow, later professor of botany and principal of University College, Cardiff, and Prof. Phillips, who became professor of botany at Bangor. Soon after leaving college, Dr. Lloyd Williams was appointed master of Garn Dolbenmaen Board School, where in addition to his school duties he pursued his botanical studies and continued to develop the musical talent which made him prominent in eisteddfod circles, both as a choir conductor and an adjudicator.

Eventually Dr. Lloyd Williams returned to Bangor, where he studied in the University College of North Wales, and graduated in the faculty of science in 1906; he was afterwards appointed to a lectureship on the staff of the Botany Department of the College. In those days, the Botany Building at Bangor was almost lapped by the waves; and under Prof. Phillips, Dr. Lloyd Williams' enthusiasm for the study of marine plants became manifest. Later, under Sir John Farmer, Dr. Lloyd Williams continued his investigations at the Imperial College, London, and began his important contributions to the life-history of the brown seaweeds. He was appointed to the chair of botany at Aberystwyth in 1916, where he was ideally placed for the continued study of marine plants. He was honoured by his colleagues by being made president of Section K (Botany) of the British Association at the Southampton meeting in 1925, and he did not resign the chair of botany at Aberystwyth until 1926, when he was seventy-one years of age. Prof. Lloyd Williams was a great teacher and a true naturalist. He endeared himself to his students, and in them his enthusiasm for the subject is reflected. To him, the field of Nature was the great laboratory, and work indoors was a corollary to that primary mode of investigation.

It is not given to many individuals to be specialists in more than one field of study, but Prof. Lloyd Williams had attained that distinction. In 1936, he became an honorary doctor of music of the University in which he already held a D.Sc. degree. He was jointly responsible, with Dr. Mary Davies, for the foundation of the Welsh Folk Song Society, and from its inception he retained the editorship of the *Journal* of that Society. He journeyed throughout Wales to collect the old melodies, and in addition to arranging those for publication, he composed two operettas, one of which, "Llew Tegid", attained great popularity.

During the War, Prof. Lloyd Williams wrote his autobiography, "Atgofion Tri Chwarter Canrif", published by Gwasg Aberystwyth, a work which was very well received. Second and third volumes followed, and at the time of his death he was busily revising proofs of the fourth volume. In these interesting books, Prof. Lloyd Williams recalls the memories of his early days. It was through indomitable courage, ability and high ambition that he was able to pursue the subjects for which he cared. He retained those interests until the close of his long life, and when approaching his ninetieth year, he visited the Cader Idris range to see again some rare plant. Possessed of a wealth of knowledge, a clear voice, a pleasant smile and ready wit, Prof. Lloyd Williams endeared himself to those with whom he came in contact. His influence in his department and in Wales remains, though with his passing we have lost a great and distinguished son of the Principality.

Lily Newton.

Dr. J. C. Mottram

J. C. Mottram was born at Holt, Norfolk, in 1880 and educated at The Beacon, Sevenoaks. He entered University College, London, in 1898, and five years later graduated in medicine. After a period of post-graduate study at Cambridge he took the D.P.H. in 1906. In the Cancer Research Laboratories of the Middlesex Hospital he worked in collaboration with Prof. Sidney Russ, and later was appointed director of the Research Department of the Radium Institute. With the inception of the Mount Vernon Hospital as a cancer hospital in 1931, he became its senior pathologist and director of pathological research, which position he held until his death on October 4.

Mottram's earlier work was devoted principally to the technique of radiotherapy. He did valuable work on the protection of X-ray workers, and served on the Radium and X-ray Protection Committee. Later he was concerned mainly with the problem of carcinogenesis. He was a man of very wide interests—a keen field naturalist, an expert fly fisherman of international repute, and an able water-colour artist, as well as an outstanding figure in cancer research.

His experience as a field naturalist and artist found practical application in the First World War, when he was appointed experimental officer in the Camouflage School of G.H.Q. He was the author of the article on natural camouflage in the "Encyclopædia Britannica" (12th edition, 1922). Another product of his interest in natural history was a book on "Controlled Natural Selection".

Mottram's wide biological outlook greatly influenced his approach to the study of cancer. For his investigations he employed a variety of organisms. Whichever seemed most suitable for the solution of the problem in hand, that was the one he employed, and

modified his technique accordingly. He excelled at work which required the minimum amount of apparatus and the maximum amount of skill and patient observation. He endeavoured to simplify the study of the action of carcinogens on cells by employing Protozoa. The result of this project was published in "The Problem of Tumours" (1942), in which he developed the thesis that the fundamental change in the induction of malignancy occurs in the cytoplasm of cells, and results in unequal cell division. Later he suggested that "the genesis of tumours represents action on cell division, whereby the exactly equal division of essential cell constituents is so disturbed that abnormal cells are formed lacking essential constituents or having some of them in abnormal abundance". According to this hypothesis, most tumours should be induced by carcinogenic agents when cell division is most active, and in subsequent papers he adduced evidence that this was the case.

It was characteristic of the man that when stricken down by malignant disease, of the outcome of which there was no doubt, his interests never faltered. While in hospital he continued the writing of papers he had in preparation, and he completed his last book on fishing, which he illustrated himself, within a few weeks of the end. His optimistic outlook and unquenchable enthusiasm for research were an inspiration to those who were privileged to be his friends.

R. J. LUDFORD.

Dr. F. R. Cowper Reed

FREDERICK RICHARD COWPER REED was born in London on June 27, 1869, and died in Cambridge on February 8, 1946. From Harrow he went to Trinity College, Cambridge, in 1888, and was later elected a scholar. He was placed in the first class of the Natural Sciences Tripos Part 1 (1891) and Part 2 (1892), and was awarded the Harkness scholarship for geology and palæontology. In 1901 he gained the Sedgwick Prize for his work on "The Geological History of the Rivers of East Yorkshire" and in 1914 took the degree of Sc.D. Reed was appointed assistant to the Woodwardian professor of geology in 1892, and retained that post for twenty-five years, his chief duties being curatorial in the Woodwardian (later the Sedgwick) Museum. After his retirement he was able to devote himself entirely to research.

In the early years of his career, Reed did some field work and wrote on the geology of the country around Fishguard (1895) and around Waterford (1897–99); but his main work was in palæontology. He dealt with many different groups of invertebrates but was especially interested in Brachiopods and Trilobites. On British palæontology, in addition to numerous short papers dealing with faunas or with individual families or genera, he wrote two monographs for the Palæontographical Society on "The Lower Palæozoic Trilobites of Girvan" (1903–35) and on "The British Ordovician and Silurian Bellerophontacea" (1920–21). Another monograph was on the Ordovician and Silurian Brachiopoda of Girvan (*Trans. Roy. Soc. Edin.*, 1917).

Reed did a great deal of work for the Geological Survey of India and contributed several monographs to the *Palæontologia Indica* during the years 1906–44 dealing with the Palæozoic faunas of the northern and southern Shan States, of Spiti, the Central Himalayas, Yun-Nan, Kashmir, the Salt Range, Tibet, etc. He also described faunas from the Bokkeveld Beds of South Africa, the Trias and Permo-Carboniferous of Brazil and the Ordovician of New Zealand. His paper on "Pre-Carboniferous Life Provinces" showed a philosophical outlook.

Reed made numerous journeys overseas, visiting Canada, Jamaica, South Africa, Kenya, Uganda, Cyprus, Palestine, India, Ceylon and Burma. The knowledge gained on these expeditions stood him in good stead when writing his "Geology of the British Empire" (1921).

He was a man of kindly nature, but so much immersed in his work that he gave the impression of leading a somewhat solitary existence.

H. WOODS.

Mr. A. H. D. Markwick

SOIL engineering in Great Britain has lost one of its most distinguished workers in the death on March 5, after a short illness, of Mr. A. H. D. Markwick at the early age of forty-one.

After graduating at the University of Manchester in 1924 with first-class honours in engineering, Mr. Markwick gained his early professional experience with two firms of consulting engineers, Messrs. C. S. Allott and Son and Messrs. Kennedy and Donkin. He entered the service of the Department of Scientific and Industrial Research at the Road Research Laboratory in 1933, and took charge of the Soils Section in 1937.

Mr. Markwick was a resourceful mathematician, a good linguist, and a sound practical engineer: his most outstanding quality was, however, his power of leadership and his ability to inspire his juniors with his own energy and enthusiasm. He came to soils engineering when the importance of the soil as a factor in road design and construction was little appreciated by British road engineers. He and his colleagues speedily remedied this state of affairs by carrying out extensive researches on soil compaction, soil stabilization and the problems involved in earth-moving and compacting machinery. This work formed the subject-matter of some twenty papers read before the Institution of Civil Engineers and other engineering bodies. The information gained proved of inestimable value during the war years, when Mr. Markwick's section was called upon to deal with many problems of aerodrome construction, the mud-crossing performance of tanks, beach-landing problems, and other special war problems concerned fundamentally with the supporting power of soil. The services of his section were also utilized by Supreme Headquarters in planning strategy and in co-ordinating the movements of armies with soil and ground conditions in the various theatres of war.

In all this work, Mr. Markwick took the leading part, and the successes achieved were largely due to his brilliance and energy. British engineering has lost a leader and his colleagues have lost a considerate and reliable friend.

T. LONSDALE.

WE regret to announce the following deaths:

Rai Bahadur Sir Upendranath Brahmachari, professor of tropical medicine, Carmichael Medical College, Calcutta, who discovered urea-stibamine and its value in treating kala-azar, on February 6, aged seventy.

Prof. Gilbert Newton Lewis, For.Mem.R.S., professor of chemistry in the University of California, aged seventy.