work in the U.S.S.R., as in the United States and Great Britain, has shown that the old agricultural prejudice against this form is ill-founded. Indeed, it has been shown that some sensitive crops, such as serradella, lupins and potatoes, may safely receive full dressings of magnesian, though not of high-calcium, limestones.

Great importance is attached by the Mechanization Institute to a double plough in which a half-size plough precedes the usual digger plough. It is claimed that this buries turf and weeds more completely and avoids dead air spaces, and it was stated that no other type of plough is to be made.

Much work is being done on the difficult problem of analysing the production of tilth and the stability of soil aggregates. It will come as a shock to exponents of ley-farming in Britain to hear that several Russian workers hold that leys should not be grazed, at least for three years, lest trampling by stock should annul the granulating action of the grass roots.

(To be continued)

OBITUARIES

Major C. E. S. Phillips, O.B.E.

By the death of Charles Edmund Stanley Phillips on June 17, many will mourn the death of a very interesting personality.

Phillips was born on February 18, 1871, his father being Samuel E. Phillips, one of the founders of Johnson and Phillips, the firm which made some of the earliest electric marine cables. He was educated privately and studied, for a short time only, at the Central Technical College, South Kensington. It may be that it was owing to his rather unorthodox education that he was so versatile.

After the discovery of X-rays in 1895, Phillips devoted much time to the making of vacuum tubes and in studying their performance in his own laboratory at Shooters Hill. His friend, H. O. Mance (now Brigadier-General Sir Osborne Mance), who was working with him, has preserved some of Phillips's letters written to him early in 1896 describing his difficulties. In a letter dated May 4, 1896, Phillips says, "this afternoon I made a Röntgen tube myself but afterwards found the glass used was lead glass so gave it up as useless". In July of the same year he writes: "I've got an experimental vacuum tube nearly finished which takes to pieces and can be cleaned and exhausted. . . . There seems no doubt that the X-rays consist of rays having various different properties and are by no means homogeneous".

Phillips continued to experiment with vacuum tubes and published in 1901 a paper, which created a good deal of interest at the time, on the effects produced by a magnetic field upon the distribution of ions within a highly evacuated space (*Phil. Trans.*, A, 197, 135; 1901). In 1908 he produced an electrical conducting glass (*Proc. Roy. Soc. Edin.*, 28, 627; 1908) from which the windows of electroscopes could be made. Unfortunately, the glass was never made commercially. In 1910 he delivered a discourse at the Royal Institution on the electrical and other properties of sand. In this he showed some striking and original experiments which might well be repeated.

Phillips was one of the founders of the Röntgen Society and read several papers before it. He served

as its president in 1909. During 1914-17 he was in charge of the X-ray Department of the Royal Herbert Hospital, Woolwich, and during 1915-18 was physicist to the X-ray Committee of the War Office. Towards the end of 1915 he gave, at the 2nd London General Hospital, a course of lectures to the orderlies of X-ray departments on the physics of X-rays, Dr. Russell Reynolds dealing with the medical side of the subject. These courses of lectures may well be regarded as the initiation of the movement for training radiographers. Phillips was much concerned at the need of protection for those working with X-rays, and served as a member of the Inter-Services X-ray Advisory Committee from its inception until its dissolution in 1939. He was appointed brevet major (on reserve to the 5th Battalion Royal West Kent Regiment) in 1918 and received the O.B.E. for his services.

Phillips was one of the founders of the British Institute of Radiology and was its president during 1930-31. He was for some time lecturer on radiology at University College, London, and was also physicist to the Royal Cancer Hospital.

In 1909 Phillips suggested the use of a trace of radium with zinc sulphide for luminizing the dials of night-marching compasses, and the first model made by him is preserved in the Science Museum at South Kensington. It is unnecessary to stress the importance of this invention.

Phillips was one of the founder fellows of the Institute of Physics, and, if he was not the first to suggest the formation of the Institute, played the leading part in its formation in 1918. He was a member of the first Board and, except for one brief interval, served on it until his death; he had been treasurer since 1925. From 1929 until a few weeks before his death he was also honorary secretary of the Royal Institution.

Phillips was an excellent violinist and enjoyed playing on his Stradivari violin. In a discourse given before the Royal Institution in May 1935, he showed how he had tried to elucidate the secrets of the tone of the violins made by the old masters. He was also a good amateur artist; his portrait of Sir William Bragg now hangs on the walls of the Royal Institution. He gave great pleasure to many friends by his facility in depicting them in caricature. He was a delightful companion with a keen appreciation of a practical joke, especially if it had a scientific background. He was at his best at the dinners of the Physical Society Club, of which he was one of the founders.

In 1903 he married Winifred, the elder daughter of the late Mr. John Baines. R. S. WHIPPLE.

Mr. R. W. F. Harrison and Mr. A. G. Hastings White, C.B.E.

THE association of the main work of a lifetime with the affairs and traditions of an old foundation is, happily, not yet rare. With the recent deaths of Mr. Robert William Frederick Harrison (July 15) and Mr. Alfred George Hastings White (July 8), at the ripe ages of eighty-seven and eighty-six years, the Royal Society has lost links with a bygone generation. Both had made its interests the centre of their own and had become steeped in its traditions, though the manners of their service and the periods over which it was rendered differed widely.

Mr. Harrison was already a man of thirty-eight,

with varied experience behind him, when he became assistant secretary; and when he retired, early in 1920, he had held the position for just under twenty-four years. He was born in the house of the London Library, St. James's Square, where his father was librarian. After schooling at Westminster he studied for and was called to the Bar, but never practised. At the age of twenty-four, in 1882, he became secretary to the Royal Society Committee arranging for observation of the transit of Venus. Then, after acting for a period as tutor to Lord Porchester, who became Earl of Carnarvon, he was secretary to the City and Guilds of London Institute and to the Art Union of London.

Fellows of the Royal Society still living will remember Harrison's entry there in 1896, when he succeeded the late Mr. Herbert Rix as the last assistant secretary to occupy the residential quarters designed for such use on the top floor of the Society's apartments. He did important services to the Society in a number of directions. The publication of the annual Year Book was due to him, he did essential work for the first three editions of the historical "Record of the Royal Society", and the attendance of the assistant secretary as minute-clerk at the Council meetings appears to have been an innovation due to him.

In those days of relative ease and leisure in the Society's affairs, Harrison, a man of rather striking personality, found time for a number of other interests. He was known as a violinist and a yachtsman. The article on the violin in the "Encyclopædia Britannica" (11th edition) was written by him, and, being a skilful carpenter, he converted a twenty-foot open boat into a yacht largely with his own hands, details of the structure, it is said, being actually fabricated in the Royal Society's rooms.

Harrison's knowledge of the Society's traditions grew with his devotion to its interests, and the devotion, as the years went by, not unnaturally took a rather possessive tinge in a man of his masterful temperament. Officers whose own experience had grown with his were easily tolerant of this, but those who had to face the changes and developments which came into view with the end of the War in 1919 doubted Harrison's adaptability to the new needs. He retired on pension, and the Council recorded the thanks due to him for his conspicuous zeal and devotion to the Society's interests; but he had not gone willingly, and he kept aloof for his remaining twenty-six years from the Society which he had so well served in his middle period.

Mr. White was a man of a very different style and temperament, whose services to the Royal Society extended over no less than seventy-three years in all. His father, Henry White, had graduated at Cambridge and qualified in medicine, but never practised, his interests being predominantly those of a scholar. Henry White had joined the staff of the Society in 1868 to edit its "Catalogue of Scientific Papers", and later undertook also the catalogue of all the books and papers in the Society's own library. By 1872 he needed help with these undertakings; and having perhaps lost faith in the value of a formal higher education, or lacking the means to provide it for his son, he took the boy Alfred at the age of thirteen from the North London Collegiate School and brought him as his assistant into the library of the Royal Society. It is of interest to remember that the Society was then still accommodated in old Burlington House, and did not move to its present quarters until a year later. It was in the Society's

library, then, under his father's tuition and by dint of his own eager and unending diligence, that Alfred Hastings White obtained all that he ever had of secondary or higher education. He attained, in fact, to a fine though unusual scholarship, including a quite remarkable reader's command of languages, both ancient and modern, and a wide and detailed knowledge of the library in which he worked and which was to be for so many years under his care. Henry White died suddenly in the Society's meeting room in 1880, leaving his son, a young man of twenty-one, to be responsible alone for completing the catalogue of the library which was published in the following year.

In 1885 the Council appointed A. H. White "to assist the Secretaries in the work of publication and the work of the library pertaining to the office of Assistant Librarian", and this was his official position until he retired in 1930. In those forty-five years he had become the friend and helper of every fellow of the Society who used or took interest in the library, and of many whose papers he saw through the press. He had none of the system or technique of modern librarianship; but Nature, assisted, perhaps, by the manner of his training, had given him an extraordinary faculty of memory. References which he had once traced—shelf, volume and page—he seemed to retain indefinitely without written record and to produce at will. His unique knowledge of the library which he loved and cherished, his accumulating fund of varied information and bookish gossip, were almost too readily available to any fellow or visitor who showed interest. For many years he continued also to carry out the duty of formal editing and proof correction of all the Society's scientific publications, in addition to his library duties, and he retained this for the biological papers until he retired.

When he retired in 1930, after fifty-eight years of service, White was full of gratitude for the arrangement made, and anxious only for assurance that he would still have access to his beloved library. The Society gave him this with the appointment of 'consulting librarian', which he retained until his death, and only the failure of his eyesight restricted his enjoyment of it.

White is known to have contributed items to such publications as *Notes and Queries*, and sets of questions on general knowledge to the more popular Press, but he published little under his own name. The best-known publication attributable to him was his scholarly edition, which appeared in 1936, of William Stukeley's "Memoirs of Isaac Newton", the original manuscript of which had come into his possession. This treasure he later presented to the Society's library—a last token of a lifetime's affection.

To the memories of both these old friends, in such different ways its devoted servants, the Royal Society pays grateful tribute. H. H. DALE.

WE regret to announce the following deaths:

Mr. R. C. Porter, for thirty-seven years lecturer in the Department of Mechanical Engineering of the University of Birmingham, on July 28, aged seventy-three.

Mr. L. G. S. Reynolds, C.B., C.B.E., formerly Assistant Under-Secretary of State, Air Ministry, and since 1944 secretary to the Standing Commission on Museums and Galleries, on June 29.

Prof. Gustav Senn-Bernoulli, professor of botany in the University of Basel, on July 10, aged seventy.