electric fields associated with the magneto-hydrodynamic wave. On the basis of this mode, an approximate calculation of the rate at which relativistic particles acquire energy leads to a time t_1 such that

$$\frac{1}{t_1} \sim \frac{1}{x} \frac{v}{c} \left(\frac{\delta H}{H} \right)^2$$

where v is the velocity of the magneto-hydrodynamic wave of wave-length λ , and δH is the amplitude of the wave. By taking v to be of the order of 30 km./sec. (the value adopted by Fermi), λ of the order of 10 light-years, $\delta H/H \sim \frac{1}{4}$, one finds t_1 to be of the order of 10^8 years, a value small enough to give agreement between astrophysical and cosmic-ray data.

V. C. A. FERRARO

OBITUARIES

Dr. C. S. Orwin

DEEP regret will be widely felt for the death of Charles Stuart Orwin at his home at Blewbury, Berkshire, which occurred on June 30. He was born at Warnham in Sussex in 1876 and was educated first at Dulwich College, then at Wye College, which he entered in 1895, its second year of establishment as an agricultural institution. He was fortunate both in his fellow students and in his teachers: the subject was new and the principal, A. D. Hall, had the gift of attracting an able body of enthusiastic pioneers. Orwin thoroughly absorbed the spirit of the place and throughout his life held it in great affection; in particular, he had great admiration for Hall, who in turn thought very highly of him.

Orwin early became interested in the organization and development of agriculture, and on leaving Wye in 1897 he worked with an estate agent in Tonbridge and then for a short time in the City of London; he returned to Wye in 1903 as lecturer in estate management. He did not, however, remain long. Mr. Christopher Turnor, who had inherited the family estates in Lincolnshire, wished to develop them on sound lines, and in 1906 he invited Orwin to take over the management; this he did with satisfaction to all concerned.

Meanwhile, A. D. Hall was insisting that agriculture as a technical subject could not be taught apart from quantitative knowledge about the various operations; he was surprised at the vague ideas on the subject of costs and times required that were held by the ordinary college lecturers. Orwin took up the subject with enthusiasm, developed systems of bookkeeping which farmers could use, and built up a body of carefully ascertained knowledge on farming operations and their results, on which a new subject, agricultural economics, could be built up. Hall by this time was the Permanent Development Commissioner and had established an Institute for Agricultural Economics at Oxford: Orwin was put in charge and, with the aid of a succession of able young colleagues, was able to produce a series of valuable reports, first on a county basis, afterwards on more general lines. He was appointed assessor to the Agricultural Tribunal set up in 1922 to study the agricultural crisis of those days, and its report, issued in 1924, for the drawing up of which he was largely responsible, is justly regarded as one of the best on the state of British agriculture.

He was much interested in the history of agriculture, and was fortunate in having an able helper

in the gifted wife of his second marriage. Together they produced in 1939 "The Open Fields", based on a study of the system still surviving at Laxton; this is now the standard treatise on the subject. His other works included an account of John Knight's reclamations at Exmoor in the early nineteenth century, a subject in which interest has been renewed by Earl Fortescue's recent reclamations, and a very readable short "History of English Farming" (1949). He adopted Hall's revolutionary view that the Government should acquire all the agricultural land of the country and redistribute it in larger units; he dealt with this in "Speed the Plough". His method of investigation is well seen in "Country Planning, a Study of Rural Problems" (1944), the work of a team under his direction.

Orwin's wide knowledge, sound judgment and deep sympathy with the small farmer and the worker made him a very acceptable member of the Agricultural Wages Board and of numerous other committees of inquiry, while Balliol College very shrewdly secured his help by making him estates bursar. He had his share of honours: Oxford conferred upon him the degree of D.Litt., Balliol made him an honorary Fellow and Wye College also elected him to a fellowship; but he lives in the memory of those who knew him as a friend ever ready to help and who steadfastly maintained the best traditions of the English country gentleman.

E. JOHN RUSSELL

Prof. F. J. Lewis

THE death of Francis John Lewis on May 24 at the age of eighty marks the passing of one of the very few links left with the grand old tradition of British botany led by Bower, Oliver, Gwynne-Vaughan and others. Unlike most of his contemporaries, however, Prof. Lewis spent most of his botanical career overseas.

He was born in London in 1875 and received his early training at the Imperial College of Science and Technology, London, and at the University of Liverpool, from which he received the degrees of M.Sc. in 1908 and D.Sc. in 1912. He was appointed demonstrator in the University of Liverpool and held this post until 1905 and then became lecturer in geographical botany until 1912. During that time he did a great deal towards establishing the branch of geographical botany in undergraduate courses. In 1912 he was appointed professor of botany in the University of Alberta, Edmonton, Canada. There he worked and developed that department for twenty-three years until he resigned in 1935.

Lewis was an exceptionally active man both physically and mentally, and this meant that he could scarcely be expected to live in retirement. So in 1935 he exchanged to a very different environment—that of Egypt, where he was appointed professor of botany in the Fouad I University of Cairo in succession to F. W. Oliver. His headquarters were for some years in the old Zafaraan Palace at Abassia. In spite of the hampering episodes of war-time in the Middle East, he developed a small laboratory on the Suez Road where he investigated the phenomena of dew formation in the desert and studied the permeability of leaf tissues. He also took a leading part in the transferring of the Botany Department to the fine new building at Giza. There he organized the spacious laboratories and built up an excellent staff of Egyptian botanists. From the

new laboratories, the botanical staff were able to work in much closer co-operation with the Egyptian Ministry of Agriculture Laboratories, the Cotton Research Laboratories and others which were nearby.

Although Prof. Lewis retired from Cairo in 1946 when he was seventy-one years of age and returned to Great Britain, he was still as active as a man half his age. He therefore accepted for one year the appointment of visiting lecturer in plant physiology in the Royal Holloway College (University of London). His knowledge of physiology and ecology stood him in good stead, not only there, but also in other activities such as that of an advisory editor to the new edition of "Chambers's Encyclopædia".

In 1905 Lewis was awarded the Cuthbert Peek Fund of the Royal Geographical Society and in 1910 he was awarded the Neill Gold Medal of the Royal Society of Edinburgh, of which he was a Fellow. He was also Fellow of the Royal Society of Canada and of the Linnean Society. His work in connexion with "Chambers's Encyclopædia" instilled in him an enthusiasm for publications, with the result that right up to the time of his death he took an active part in forming a liaison between the publishing firm of Macmillan and Co., and British universities, visiting them all in turn.

W. LAWRENCE BALLS
L. J. F. BRIMBLE

NEWS and VIEWS

The Indian Botanic Garden : Dr. K. P. Biswas

DR. K. P. BISWAS retired on August 1 from his post as superintendent of the Indian Botanic Garden. He was appointed curator of the Herbarium of the Botanic Garden in 1927, and superintendent in 1938 when Mr. C. C. Calder retired. Dr. Biswas specialized in Algae and systematic botany. He was granted study leave in Europe during 1937-38 and worked at Dr. F. E. Fritsch's laboratory at Queen Mary College, the Edinburgh Botanic Gardens and at the Herbarium of the Royal Botanic Gardens, Kew. During this time he was awarded the D.Sc. degree of the University of Edinburgh. He has published a number of papers in the *Records of the Botanical Survey of India*, of which he was the editor, and in several local and foreign journals—*Kew Bulletin*, *Hooker's Icones Plantarum*, etc. He has also published some important botanical treatises, among which is "Bharatiya Banaushadhi" in Bengali (3 vols.)—a joint publication for which he was awarded the Rabindra Memorial Prize in Science in 1951-52. A book on "Medicinal Plants of Sikkim Himalaya" is now passing through the press as a result of his detailed study of the Flora of Sikkim Himalaya. Improvements of the Garden and its amenities were effected during the past twenty-eight years of his service by introducing and acclimatizing many plants both in the Lloyd Botanic Garden, Darjeeling, and the Indian Botanic Garden, Calcutta. The Lloyd Botanic Garden, Darjeeling, was re-organized into a Phyto-Geographical Garden by arranging the plants according to their proper classified order. Dr. Biswas takes keen interest in the cultivation of medicinal plants in India. It was at his initiative that the Government of West Bengal started the cultivation of plants yielding some important drugs in the Eastern Himalaya (Rungo) under the joint auspices of the Medicinal Plants Committee of the West Bengal and of the Medicinal Plants Scheme of the Indian Council of Agricultural Research. During his regime extensive collections were added to the Botanic Garden Herbarium from South Burma, Naga Hills, Manipur (Assam), Sikkim, Orissa, Bihar (Santhal Parganas), etc. In India he has received many honours, such as the Elliot Medal and Bruhl Medal of the Asiatic Society of Bengal. He was president of the Botany Section of the Indian Science Congress in 1943, president of the Botanical Society of India in 1952 and president of the Botanical Society of Bengal during 1948-50. He is honorary lecturer in botany in the University of Calcutta.

Dr. D. Chatterjee

DR. D. CHATTERJEE, systematic botanist at the Indian Agricultural Research Institute, New Delhi, has been appointed to succeed Dr. Biswas. Dr. Chatterjee was born at Chinsurah, near Calcutta, on April 2, 1911. He studied botany at the Presidency College, Calcutta, where he specialized in systematic botany. Later, he went to the University of Edinburgh and was awarded the Ph.D. degree of that University in 1939. His work in Edinburgh consisted of a critical study of the distribution of the Himalayan and Indian flora. On his return to India in 1939, Dr. Chatterjee worked for some time at the Indian Botanic Garden, Calcutta, and in 1940 went to Burma as a lecturer in botany in the Agricultural College, Mandalay. The War in Burma, however, did not allow him to stay there long and he returned to India in April 1942. He worked again at the Indian Botanic Garden, Calcutta, for nearly a year, and later, in July 1943, he was appointed a lecturer in botany at the Cotton College, Gauhati, Assam. He again went to Britain early in 1946 and joined the Royal Botanic Gardens, Kew, London, as botanist for India, from which he published some valuable papers dealing with new discoveries of several plants and on nomenclature of plants. In 1948, while working at Kew, he was deputed by the Government of India to attend the Symposium on Botanical Nomenclature held at Utrecht, Holland. Dr. Chatterjee returned to India from Kew in April 1949 and was appointed systematic botanist in the Indian Agricultural Research Institute, New Delhi, in June 1949. While there he published papers dealing with the origin of cultivated rice and other cultivated plants. He has also taken up the classification of cultivated wheats of India. In appreciation of his work on Indian flora, Dr. Chatterjee was made a vice-president of the International Botanical Congress held in Paris in 1954, and was awarded a Special Centenary Medal of the Société Botanique de France. He was also awarded the Brühl Memorial Medal of the Asiatic Society of Bengal this year (1955), for meritorious work done in the field of botanical research during the past five years. Dr. Chatterjee has travelled widely and has worked in several European herbaria and botanical gardens. In view of his long experience in taxonomy and nomenclature, we feel confident that Dr. Chatterjee will prove a very able superintendent of the famous Botanic Garden at Sibpur, Calcutta.