

balance of activity between coal production and chemical processing of coal in order to maintain an appropriate balance between demand and supply. Pointing out that such measures could not in themselves solve the problems of the industry, he estimated, nevertheless, that a very valuable contribution is possible.

The vital importance of a thorough investigation of the actual resources in Britain of the various types of coal was emphasized by Prof. Hickling. In the 'rapid survey' recently made by the Fuel Research Department, these were classified into nine main groups, based on their volatile yields and coking properties. The broad result of the survey was to show that, while the reserves of nearly all types are likely to last for another century, and some for substantially longer, the outlook is very different when the various coalfields are considered individually. In the North-Eastern coalfield the best metallurgical coking coals, practically confined to this field, are likely to be exhausted within fifty years. The coals in this and other fields show systematic area variation in composition, so that as different areas are exhausted the general character of the coal produced must change progressively. The valuable anthracites and low-volatile steam-coals, of which our known resources are practically confined to a portion of the South Wales field, are likely to be exhausted before other types from that field.

Prof. Hickling specially stressed the fact that while the proved coal resources of Great Britain give no ground for concern as to the immediate future, we cannot justify their continued exploitation without the fullest assessment of their extent and the probable duration of various types in different areas. The relatively large area of exposed and long-known coalfields, along with other circumstances, has long delayed attempts to locate possible buried coalfields which may yet be found. Modern methods of geophysical survey, elaborated in the search for oil, can now be applied to localize this problem and to prepare the way for final investigation by boring. This is a project of urgent importance.

Every coal is a complex mixture of substances of widely differing properties. Some of these may be separated with relative ease, others only with greater difficulty. There is a wide field for investigation of the economic possibilities of the preparation of coals on such lines, either for their use as special fuels or as raw materials. Blending of coals or of their separated components also demands development. In Great Britain little attention has been paid to the fact that at any point the deeper coals are in general of higher carbon content than those above. As mining is necessarily being driven deeper, this in turn must have an influence on the average quality of future products.

The final speaker, Mr. Maclean, refused to take a pessimistic view of the future of the industry, and declared that he is satisfied that within the next decade the National Coal Board will be producing about 250 million tons of coal per annum. Costs could be cut by reorganising transport arrangements so that a higher proportion of the available manpower may be concentrated at the face. He then referred to the very high average age of the present labour force in the mines, and stressed the need for stimulating juvenile recruitment. In this connexion, the Board has adopted a plan which should make mining a more attractive occupation to young entrants. In future, when a boy enters the industry,

an assessment of his potentialities will be made at the end of his statutory training. If suitable, he will pass on at the age of sixteen to receive a course of general instruction in mining, and at eighteen will specialize in mechanics, electricity, surveying and mine management. Beyond this stage, scholarships will be available to take the best men on to the university. Mr. Maclean is satisfied that as these plans bear fruit the industry will prosper, and the country will not regret the decision to organise it on national lines.

A. BEACHAM

OBITUARIES

Prof. Major Greenwood, F.R.S.

MAJOR GREENWOOD, professor emeritus of epidemiology and vital statistics in the University of London, died on October 5 as he was about to take the chair at a meeting of the Cancer Research Committee. He was sixty-nine. His father, Dr. Major Greenwood, was a general practitioner in north-east London, a man of many parts interested in the humanities. From him Greenwood inherited literary tastes and a love of the countryside, particularly Epping Forest, where he lived for more than forty years, at Loughton. He used to recall with pleasure long cycle rides taken as a boy with his father in Essex and a holiday in Skye. I had known him for forty-five years at work and at leisure.

Greenwood was educated at the Merchant Taylors' School, of which he always spoke with affection, on the classical side, and there obtained a sound training in mathematics, to be extended later by private reading in the midst of many other activities. Nor did he let the classics slide. In later life he read early Latin texts of medical writers unaided, though he relied on his friend and colleague, Dr. May Smith, when reading obscure and un-Attic Greek texts.

From school he entered the London Hospital Medical College, qualified M.R.C.S., L.R.C.P. in 1904, and remained there as demonstrator in physiology, under Prof. Leonard Hill, until 1910. His first book, "The Physiology of the Special Senses", was published in that year. During those years he also studied with Prof. Karl Pearson at the Biometrical Laboratory at University College, and learnt the then new technique of mathematical statistics applied to natural selection in man, a technique he was to employ later with brilliant results in his own chosen fields of vital statistics and epidemiology. In 1910 Greenwood was appointed statistician to the Lister Institute, and remained attached to the Institute until he was asked to take charge of medical statistics at the newly created Ministry of Health in 1919; but for the last two years of the First World War he was seconded to take charge of the medical research section of the Ministry of Munitions. His work during that period on the frequencies of repeated accidents among munition workers, done in collaboration with G. Udny Yule, was based on an application of a generalized Poisson series; it became a classic and inspired fundamental work later by his colleagues, Newbold and Soper, at the School of Hygiene, and applications by the staff of the Industrial Health Research Board.

Greenwood left the Ministry of Health in 1928 to become the first professor of epidemiology at the London School of Hygiene and Tropical Medicine, a

post which he held until his retirement under the age limit in 1945. This period included, among many other activities, his long collaboration with the late Prof. W. W. C. Topley, in research in experimental epidemiology. In this work mice, whose allotted span is three score and ten days rather than years, took the place of men. A healthy colony of mice, would have added to it at predetermined intervals controlled proportions of mice inoculated with virus diseases capable of producing epidemics. Controlled numbers of healthy 'immigrant' mice were added from time to time. Fluctuations in the numbers of affected individuals as the number of susceptibles was reduced by death, and a study of the relevant life-tables, were used as models for the rise and fall of epidemics in human communities, with the technical advantage that two or three years covered many generations.

Greenwood was chairman of the Statistical Committee of the Medical Research Council from its inception until 1948, for many years a member of the Senate of the University of London, of many of its committees and of the Board of Studies in Statistics. His connexion with the Royal Statistical Society was long and intimate: fellow in 1909, joint honorary secretary 1919-34, president 1934-36, Guy Medal in silver in 1929, Guy Medal in gold—a rare distinction—in 1945. To the list of honours and distinctions must be added the conferment of the F.R.C.P. in 1924, D.Sc. London in 1928, the Buchanan Medal of the Royal Society in 1927, and election to the fellowship of the Royal Society in 1928, Arris and Gale Lecturer at the Royal College of Surgeons during 1907-8, and Milroy Lecturer at the Royal College of Physicians in 1922.

The scientific importance of Greenwood's work was recognized at home and abroad. At home he was asked to give the Linares Lecture at Oxford in 1943, and short courses on epidemiology at Cambridge. Abroad he became one of the limited number of English members of the Institut Internationale de Statistique, and co-editor of *Metron*. He was appointed Herter Lecturer at Baltimore in 1931, choosing "Epidemiology, Historical and Experimental" for his subject. Most of the above lectures were published in book form. He also published in 1921, with Prof. E. L. Collis, "The Health of the Industrial Worker". Though Greenwood published many papers, particularly in *Biometrika* and the *Journal of the Royal Statistical Society*, much of his work is buried in reports to the Ministry of Health, and the published work of his colleagues and pupils owed much to his inspiration and advice.

The persecution of scientific workers and of freedom of thought, in any quarter, touched Greenwood to the quick. From 1933 onwards he was an active supporter of the Academic Assistance Council, later the Society for the Protection of Science and Learning, and acted as its treasurer. He helped many exiled scientific men to find an opportunity of continuing their work in Great Britain.

Greenwood's scientific work was characterized by the fact that, though he was not a professional mathematician—he always spoke of doing 'sums'—he had a sound mathematical instinct. In this his closest parallels were Faraday in electricity and magnetism, and in his own subject, Graunt and Farr. His mathematician friends were often asked by him to supply a mathematical proof of what Greenwood felt the figures must mean, and almost invariably his

intuition was right. He had a tenacious memory and could quote Shakespeare and Heine unhesitatingly. Greenwood was a brilliant conversationalist. He will be missed in many circles, but nowhere more than at the centenarian Statistical Dining Club.

He married in 1908. The loss of his wife in 1945 was a blow from which he never recovered. He leaves two sons.

L. ISSERLIS

10/6

Sir Herbert Read, G.C.M.G., C.B.

By the death of Sir Herbert James Read on October 16, tropical medicine has lost one of its best friends and supporters, and his name is interwoven with the history of that branch of medicine. Born in 1863 and educated at Allhallows School, Honiton, he entered the Colonial Office as a higher-division clerk; but soon, by his assiduity, tact and industry, he rose, step by step, until he became assistant private secretary to Mr. Joseph Chamberlain, then Colonial Secretary, at the height of his career (1896). At this time Chamberlain had been gravely concerned about health conditions in West Africa. It was through Read's instrumentality that the name of Patrick Manson was brought to Chamberlain's notice, and this historic association between these two pioneers began. "His attention," so wrote the Colonial Secretary, "was definitely directed towards the importance of scientific enquiry into the causes of malaria and of special education in tropical medicine for the medical officers of the Crown Colonies."

Thereupon a subcommittee was appointed, consisting of H. J. Read and others, and this soon resulted in the foundation of the London School of Tropical Medicine at the Albert Docks on Manson's fifty-fifth birthday, on October 3, 1899. It was clear that the work could not stand still, and further funds were needed. This culminated in the appeal of Sir Austen Chamberlain in 1905. In all these matters Read was most active, through his innate powers, almost amounting to genius, as a committee man. Another boon to tropical medicine and tropical workers all the world over was the foundation of the Tropical Diseases Bureau in 1908, of which he was an active member of the Management Committee, supervising the production first of the *Sleeping Sickness Bulletin*, then of the *Tropical Diseases Bulletin* and, more recently, of the *Bulletin of Hygiene*. In 1921 Sir Herbert Read was elected an honorary fellow of the Royal Society of Tropical Medicine and Hygiene, and he was active afterwards in the establishment of Manson House as the headquarters of the Society. Read joined the Committee of Management of the Seamen's Hospital Society—the body most closely associated with tropical medicine in London—in 1898 and was a vice-president of the Society at the time of his death. He was also interested in the sister School of Tropical Medicine in Liverpool, of which he was a vice-president.

In all matters connected with the health of Colonial officials, Sir Herbert Read took the keenest interest, a fact of which consultants to that Department soon became aware. In the more particular matters of research he was also well versed. During 1924-30 Read was governor of Mauritius, and during his term of office great sanitary reforms were instituted, so that he had ample opportunities of becoming acquainted at first hand with the scourges of malaria, in particular, which he had formerly studied in Blue