carcinogens, and also on the nature of the cancer-producing factors in addition to benzpyrene which are present in tar. This work, and the experiments of Woodhouse at Birmingham on petroleum, might give valuable information if an attempt were made on the part of a government inspectorate to assess the risks of using certain petroleum products. However, any such tests and recommendations would have little effect so long as industrial substances which are carcinogenic are not handled entirely by mechanized processes.

Glücksman, at Cambridge, has treated mouse tissue with X- and γ -rays in combination with co-carcinogens to see if the same synergistic effect can be observed as with chemical carcinogens. No such effect was detected, and histological examination showed profound differences between the papillomas induced by radiations and those induced by benzpyrene. Also at the Strangeways Laboratory, Lasnitzki has found that when an adenocarcinoma in mice is irradiated with X-rays, two-thirds of the injurious effect on the tumour is indirect and is brought about by changes in the still normal tissue surrounding the tumour. Thus the conclusions of Koller, arrived at by studies on irradiated tumours in human subjects, have been confirmed experimentally.

Peacock, at Glasgow, has investigated the co-carcinogenic action of croton oil added to overheated (365°) edible oil in feeding experiments on mice. He found that cancerous changes were brought about in the alimentary tract, although the proportion of positive results was much smaller than in experiments with carcinogenic hydrocarbons on skin or connective tissues. Similar tests on mice mutants produced by methylcholanthrene (Strong) which are particularly liable to gastric cancer might show facilitation of the effect of feeble carcinogens in the diet.

Pybus and Miller, at Newcastle, and also Carr, at Edinburgh, have been studying gene mutation produced by the administration of carcinogenic hydrocarbons to mice. The mutation theory has had an eventful career in cancer research. One of the first to propose that cancer cells are mutant forms of normal cells was Boveri, in 1912 X-rays and radium had long been known to be carcinogenic, when Muller in 1928 discovered that X-rays greatly increased the spontaneous mutation-rate in *Drosophila*. During the War, Auerbach *et al.* found mustard gas to be a potent mutagen; but unfortunately for the theory, Berenblum had shown that it prevents carcinogenesis by the hydrocarbons. Strong's discoveries have now been followed by a report from Demerec that benzpyrene and other carcinogenic compounds bring about mutations in *Drosophila*. He finds about 84 per cent correspondence between carcinogenic and mutagenic potentiality in a number of compounds given to the fruit fly in the form of a fine mist.

Sir Ernest Kennaway and Lady Kennaway are continuing their statistical work on the Registrar General's returns, and point out that in eighteen years the deaths from cancer of the lung in England and Wales have increased 16½ times in men (nearly 6,000 in 1945) and 8 times in women, although diagnosis must have been doubtful in some cases.

One of the most interesting conclusions in this investigation runs: "Cancer of the lung differs from that of the upper alimentary tract, larynx and skin in showing no inverse relation to ascent in the social scale (Stevenson, 1923). This suggests an airborne factor, as owing to the mixing action of the wind, there is less difference in the outdoor air breathed by

different classes than in other social conditions such as food and cleanliness."

Hieger, in experiments on endogenic carcinogens, finds that these substances are concentrated in the cholesterol-rich fraction of tissues, not only from cancerous and non-cancerous human subjects, but also in commercial cholesterol obtained from cattle brain and spinal cord or from fish livers. Some recent results were described in this journal ("Carcinogenic Activity of Preparations Rich in Cholesterol", *Nature*, 160, 270; 1947).

OBITUARIES

Dr. Bernard S. Dyer

THE death of Dr. Bernard Shirley Dyer on February 12, in his ninety-second year, marks the passing of one of the very few remaining pioneers of agricultural chemistry of the late nineties.

Born in London on February 25, 1856, the son of J. A. Dyer, a well-known London journalist, Bernard Dyer was educated at the City of London School. On leaving school at the age of seventeen he became a pupil assistant in the laboratory of Dr. Augustus Voelcker, consulting chemist to the Royal Agricultural Society, spending three years there and later taking the University of London degree of B.Sc. In 1877, at the early age of twenty-one, he established his laboratory at 17 Great Tower Street, London, where he remained until the laboratory was destroyed in the 'blitz' of May 1941. Here, while engaged in building up a practice in agricultural and food chemistry, he devoted much time in his earlier years to the publication of a series of agricultural articles in the scientific and lay Press, and also undertook a very considerable amount of lecturing throughout the country. About this period he was appointed consulting chemist to the Devon Agricultural Society, and later to the Essex and Leicestershire Societies.

There can be little doubt that Bernard Dyer's training with Voelcker had led to a specialization in agricultural chemistry which determined his future trend and the major interest in his life. Year after year, papers were published dealing with field investigation work, and, in particular, with the use and application of fertilizers and the necessity for far larger amounts than was then customary in Britain. Then came some years of work on the vexed question of soil analysis as a means of indicating the availability of the mineral constituents of the soil. The suggestion had already been made by Sachs that plants extracted their mineral food from the soil by the solvent action of the root sap exuded from their root hairs, and Tollens and Stutzer had suggested the use of a 1 per cent solution of citric acid for the assessment of the relative 'availability' of phosphatic fertilizers. Bernard Dyer attacked the problem from this new angle. He first determined in his laboratory the root acidity of about a hundred plants, and found the average figure to be the equivalent of 0.9 per cent citric acid—a figure substantially that suggested by Tollens and Stutzer. He then, in 1889, systematically analysed soil samples from twenty-two plots of Hoos Field, Rothamsted. The outcome of this work was the elaboration of the now well-known method of soil extraction using a 1 per cent citric acid solution. This was published in the *Journal of the Chemical Society* in 1894, and for this investigation the

University of London granted him the degree of D.Sc.

The next years were devoted to the larger task of examining the soils of the historic Broadbalk wheat field, including plots manured and unmanured for fifty years. The results of this work were recorded in 1901 in the *Philosophical Transactions of the Royal Society* in a paper entitled "A Chemical Study of the Phosphoric Acid and Potash Contents of the Wheat Soils of Broadbalk Field, Rothamsted". The paper was published shortly after the death of Sir John Lawes, to whom the inspiration of this particular investigation had been due. Shortly before this, in 1900, Dyer delivered the triennial course of Rothamsted American Lectures at Newhaven, U.S.A., afterwards published by the United States Department of Agriculture under the title of "Results of Investigations of the Rothamsted Soils". In 1893 he published a little book, "Fertilizers and Feeding Stuffs"; and in 1924 a book on "The Manuring of Market Garden Crops", this latter being a record of the results obtained from more than twenty years of field experimental work in Kent.

Turning to his other great activity, Bernard Dyer became an original member of the Society of Public Analysts in 1875, and to the affairs of this Society he gave much of his time, first as a member of council in 1880, and then as joint honorary secretary during 1883-96, when he was elected president in succession to Sir Thomas Stevenson. He contributed many papers to its journal, *The Analyst*, and, in collaboration with Dr. C. Ainsworth Mitchell, prepared its history, "Fifty Years of the Society of Public Analysts". He was elected an associate of the

Institute of Chemistry during the year of its formation (1878) and became a fellow in 1880. He was an original member of the Society of Chemical Industry, and acted as chairman of its London Section during 1923-24. He held official appointments as agricultural analyst, as public analyst, and as official analyst to the London Corn Trade Association.

Dyer married twice, first Alice Collett, and secondly in 1890 Edith Steel, who survives with two of their three daughters.

Dr. Bernard Dyer will be remembered by all his friends for his great personal kindness and charm. As a member of many societies, he was greatly esteemed by his colleagues and held in the greatest affection by his juniors, who remember his kindly help in their struggling years. As an analyst he was austere in the conception of his duty in seeking the truth.

G. TAYLOR

WE regret to announce the following deaths:

Mr. Griffith Brewer, president during 1940-42 of the Royal Aeronautical Society, and a pioneer of aeronautics in Great Britain, on March 1, aged eighty.

Prof. R. T. Chamberlin, emeritus professor of geology in the University of Chicago, aged sixty-six.

Dr. A. L. Du Toit, F.R.S., lately consulting geologist to the De Beers Consolidated Mines, on February 25, aged sixty-nine.

Mr. G. S. W. Marlow, secretary of the Faraday Society, on March 5.

Sir Charles Grant Robertson, C.V.O., principal and vice-chancellor of the University of Birmingham, on February 28, aged seventy-eight.

NEWS and VIEWS

Radio Research in Great Britain:

Dr. R. L. Smith-Rose

IN 1920 the Department of Scientific and Industrial Research, guided by a newly formed Radio Research Board, started research in radio, which had grown in importance during the First World War. Most of the work was done at a field station at Slough under R. A. (now Sir Robert) Watson-Watt, and at the start attention was mainly devoted to investigations on atmospherics, direction-finding and the propagation of waves over the ground. When, in 1924, Appleton and Barnett demonstrated the reflexion of radio waves from the ionosphere, they asked the co-operation of Slough in fundamental experiments which laid the foundations of our present knowledge of the subject. Later, much of this experimental work was transferred to Slough, still under Appleton's guidance, while he continued his own work at Cambridge. In this way there grew up at Slough a team skilled in the use of pulses for the determination of distance by radio methods, which was able to turn its energies to the development of radar when the time came. In 1933 Slough and other radio research stations under the Department of Scientific and Industrial Research had been formed into a Radio Division of the National Physical Laboratory, with Watson-Watt as superintendent. In 1935 he took away a small team of experts to start a secret radar establishment, and Dr. R. L. Smith-Rose succeeded him. Just before, and during, the War, the ionospheric investigations at Slough developed so as to provide a world-wide organisation

for the forecasting of propagational conditions on different wave-lengths, and there has, in addition, been considerable work on direction-finding, the propagation of ultra-short waves through the troposphere, the development of *radio sonde*, and the measurement of the electrical properties of soil and water at radio frequencies.

A new arrangement has recently been announced by which it is intended to combine the work at the National Physical Laboratory and Slough and to transfer it to a new establishment under Dr. Smith-Rose as director of radio research. The new establishment will, by this arrangement, have a director who has been personally active in several lines of research. In the early days at Slough he was engaged, with Barfield, in investigations of the propagation of waves over the surface of the earth and in problems of direction-finding. The study of propagation led him to work on the electrical properties of soil and water, and to investigate the forward tilt of waves travelling over the ground; the work on direction-finding led to a clear understanding of the part which the wave deviated by the ionosphere can play in producing errors in a loop direction-finder, and to an explanation of the errors produced by conducting bodies near the loop, the so-called site-errors. He has published papers on the propagation of waves through the troposphere and on improved methods of direction-finding, particularly on very high frequencies. He has been chairman of the Radio Section of the Institution of Electrical Engineers, and was decorated with the United States Medal of Freedom with Silver Palm for his work in radio during the