

means of ingress to the antitubercular field. In adding to such approaches, many physical methods of controlling yeast and bacterial growth in the brewery have still to be explored. Ultra-violet sterilization has not been without success; ultrasonic treatment may be of value in this way as well as in rapid 'conditioning' (so far as protein precipitation is concerned), and cathode-ray treatment, now receiving intensive examination in processing foods, may provide another sterilization treatment lacking the disadvantages of pasteurization.

Turning more particularly to some aspects of brewery fermentation, only very recently has there become available even a partial view of the carbohydrates and of the amino-acids and other nitrogenous constituents of brewers' wort, as well as of their value as yeast nutrients and substrates. A brewery yeast, however, must obviously effect a composite fermentation, and in studying the component parts the National Collection of Yeast Cultures, which will be a responsibility of the Brewing Industry Research Foundation, seems likely in many instances to play an important part. Subsidiary collections of brewers' yeasts and of genetically pure and hybrid yeasts should have a peculiar research interest. The hybridization of yeast has only recently been intensively studied, mainly by Winge and his associates, who have provided much of the available data on the sporing and on the haplo- and diplo-phases of certain species of *Saccharomyces*. This work has proved valuable in the selection of hybrids for simple fermentation yeasts, but its exploitation in the brewery has hitherto been less marked. Such exploitation is, however, brought nearer by recent work of Thorne, who has succeeded in hybridizing several British top-fermentation brewery yeasts. Selection of the hybrids reveals that flocculence is a genetically controlled character. The observed segregation of the readily mutating hybrids makes it appear that not less than three genes are concerned with the appearance of flocculence, while still another seems concerned with inhibiting the expression of flocculence.

There are innumerable other points at which microbiology touches brewing. These range from the use of insecticidal washes in hop culture to the importance of wild yeasts in brewery casks, from the disposal of potentially toxic materials by yeasts to the formation of valuable vitamins. These are but a few of the problems which research in the not too distant future should do much to answer.

OBITUARIES

Mr. J. W. Tutcher

By the death, on April 11, of John William Tutcher, in his ninety-third year, geology has lost one of its outstanding amateur workers. He will be remembered particularly for his many contributions to the study of the palaeontology and stratigraphy of the Jurassic rocks of the Bristol district, and for his pioneer work in scientific photography.

Until recent years Mr. Tutcher carried on business as a bootmaker in Bristol; but most of his leisure was devoted to geology. In his younger days this frequently involved cycling out before business hours to the quarries of Dundry Hill and, when some particularly interesting bed was being uncovered, walking back with his cycle loaded with specimens.

When his own lameness is borne in mind, one could only marvel at his success in bringing together and preparing the collections which overflowed into all parts of his home. Apart from numerous specimens which found their way into other museums, the Bristol City Museum has more than 20,000 fossils from the Tutcher Collection, all with details of locality and precise horizon. At all times his specimens were placed at the disposal of other geologists, and many younger geologists owe much to his ready help. He wrote comparatively little himself, unless very strongly persuaded; but he contributed several papers to the *Proceedings of the Bristol Naturalists' Society* and to the *Quarterly Journal of the Geological Society*. For many years he worked with the late S. S. Buckman, and his name appears on the title-pages of the seven volumes of "Yorkshire Type Ammonites" and "Type Ammonites", for which he provided most of the photographs. But his contribution, as Buckman always freely admitted, was not confined to the preparation of plates; his great knowledge of the detailed stratigraphy of the Lias in particular was of great service to his collaborator.

Mr. Tutcher was probably the first person in Britain to build a piece of equipment for the lighting and photography of fossils, a work in which he acquired such skill that, twenty years ago, it was nearly always possible, on skimming a volume of geological papers, to pick out by their high quality the illustrations prepared by Tutcher; for in this field he was always ready to help others, and it has been estimated that he provided for reproduction photographs of several thousand fossils.

Mr. Tutcher was awarded the Lyell Fund by the Geological Society in 1924, and received the honorary degree of master of science from the University of Bristol in 1927. He was for many years a prominent member of the Bristol Naturalists' Society, of which he became president. He was also president of the South-Western Naturalists' Union. His modesty and kindness will long be remembered by those who were privileged to work with him. A. E. TRUEMAN

Prof. F. K. Kleine

PROF. FRIEDRICH KARL KLEINE, a distinguished pioneer and leader in the field of research into tropical diseases of man and animals in Africa, died in Johannesburg on March 22 at the age of eighty-one.

Kleine was born on May 14, 1869, at Stralsund, a Baltic port of Germany. He was the son of a medical practitioner, and early decided to follow his father's profession, entering the University of Halle as a medical student. After qualifying, he worked at the Pharmacological Institute in Halle, and at the University Clinic in Kiel, and served also for a time in the Army Sanitary Service. In 1900 he was appointed to the staff of the Institute for Infectious Diseases in Berlin, and there became personal assistant to Prof. Robert Koch, the discoverer of the tubercle bacillus and of the cholera vibrio. In 1903 Kleine went with Koch to Southern Rhodesia to investigate a disease, thought to be redwater, in cattle, which was causing great economic losses. Their investigations showed the disease to be tick-borne and distinct from redwater, and they named it 'African coast fever'. This finding led Kleine to become one of the first to work on the developmental stages of the parasite of tick fever in dogs—a story which is still not properly elucidated. During 1906–7