

SOCIETY OF AGRICULTURAL BACTERIOLOGISTS ANNUAL MEETING

THE Society of Agricultural Bacteriologists held its fifteenth annual meeting at Leeds during December 17-19. The papers and the discussions covered a much wider field than is implied by the Society's title, a tendency which has become increasingly apparent each year since the Society adopted a policy of opening its membership to workers in all branches of bacteriology. Dr. W. T. Astbury gave an address on the electron microscope, followed by a demonstration of the instrument.

A contribution to the subject of disinfection dealt with the fundamental processes leading to the death of bacteria. In this work *Bacterium coli* was used as the test organism and phenol as the disinfectant. Special precautions were taken to avoid environmental changes during the tests, the phenol being added to cultures of the organisms grown in a special apparatus designed to ensure stable conditions throughout the period of the experiment. The experiments covered a range of phenol concentration from 3.48 to 8.0 gm./l., and a temperature range of 20-42° C. The results obtained led to the conclusion that the logarithmic curve of disinfection is really only an approximation, due to the process of disinfection proceeding too rapidly in the early stages to be estimated. The true disinfection curve indicated a slow initial death-rate, followed by a rapid rise to a high value; the peak value was followed by a rapid and then by a slower decline, the death-rate becoming constant at the extreme end of the process of disinfection.

Starr's aniline blue medium for the detection of lipolytic organisms has been improved by staining the butterfat substrate with Waxolene Red 111S (I.C.I.), which ensures optimum colour differentiation between lipolytic and non-lipolytic colonies. Tests on forty-four cultures of lipolytic and non-lipolytic bacteria showed the new medium to be equal in discriminating powers to the copper soap method while possessing the added advantage that colonies could be subcultured following differentiation. It gave less false-positives than tributurine agar. Details of its preparation were given.

A study of methods suitable for assessing the sterility of equipment used in dairy and food manufacturing operations has shown the value of swab methods for this purpose. Colony counts on swab solutions from surfaces were normally much higher at 32° C. than at either 37° C. or 22° C., especially in the case of plant used for raw milk, meat canning, and in the bakery. The results emphasized the desirability of incubating plates at more than one temperature, and indicated 32° C. to be the temperature of choice when only one incubator was available. The predominating flora of swab solutions from the various types of plant examined was described, and the value of the swab technique in tracing the source of specific fault-producing organisms in large equipment was emphasized.

Since the adoption of the methylene blue test as an official method for the examination of heat-treated milk, increasing interest has been taken in the use of dye-reduction tests for this purpose. The results of various bacteriological methods of testing pasteurized milk were related to keeping quality in a study of 505 samples of pasteurized milk distributed by

twenty-seven dairies during a period of twelve months. Neither the colony count at 37° C., the methylene blue test, nor the resazurin test were suitable measures of keeping quality when applied on the day of distribution; but the dye-reduction tests proved suitable for detecting milk with a poor keeping quality, when the samples before testing were stored at 18° C. from 3 p.m. on the day of distribution until 10 a.m. the next morning. The value of the coliform test for the examination of pasteurized milk was also once more confirmed. A simple lagged water bath, utilizing mains water for cooling, with thermostatically controlled electrical heating, was used for maintaining a temperature of $18 \pm 1^\circ$ C.

The examination of raw milk by the resazurin test continues to receive attention as a means of grading milk. The suitability of this test as a measure of keeping quality was assessed by comparison with the methylene blue test, the colony count and the titratable acidity, the results being subjected to statistical analysis.

In an attempt to explain occasional discrepancies between the results obtained by the resazurin and other tests on raw milk samples, the effect of pure cultures and of cells on the reduction of the dye has been investigated. Pure cultures of bacteria were found to vary markedly in their power to reduce both resazurin and methylene blue, although the more active milk-souring organisms reduced the dyes faster than organisms not possessing this property. *Streptococcus agalactiae* and *Bacillus subtilis* were notable exceptions, the former being a poor reducer, and the latter reducing resazurin at an appreciable rate. Methods of measuring the relative reducing activity of cells and bacteria were discussed, and the difficulties emphasized. Neither the enzyme inhibitors used nor the temperature effects tried provided a satisfactory solution to the problem.

Theoretical consideration has been given to the possibility of developing a more rapid and equitable method for testing large numbers of raw milk samples. Since souring is the predominating cause of defects and difficulties in handling, it was assumed that measurement of the increase in acidity under standard conditions of storage was most likely to offer a solution. Of the three methods available, titratable acidity was considered too cumbersome for routine purposes, and conductivity measurements, though technically relatively simple, were not considered a sufficiently sensitive measure of increase in acidity. It was eventually decided to depend on pH value, determined with a glass electrode. A close relationship was found to exist between decrease in pH value and increase in titratable acidity.

The cleansing and sterilization of milk bottles and other surfaces in which the strength of detergents governs the efficiency of the processes is a problem of immense commercial importance. Titration methods are normally used for estimating and controlling the strength of detergents, but a method involving a direct-reading meter has obvious advantages. Preliminary work indicated the suitability of a direct-reading conductivity meter, and the construction of an apparatus suitable for use in detergent solutions in dairy equipment was described. Owing to variations in the constituents of commercial detergents, calibration of the instrument was found to be necessary for each detergent. The method had the further disadvantage that it was less sensitive to changes in the concentration of sodium hydroxide

than it was to those of other salts, although it was pointed out that the majority of commercial detergents consist largely of carbonates and phosphates.

An extensive survey, covering the period 1930-44, of the incidence of *Mycobacterium tuberculosis* and *Brucella abortus* in herd bulk milk from individual farms in mid- and west-Wales was reported. Some figures for school supplies of pasteurized milk, for bulk creamery skim milk, both raw and pasteurized, and for udder samples from suspected cows were also included. Reasons were advanced for the very low incidence of tubercle infection (0.74 per cent for 2,155 samples) in farm supplies. No tubercle bacilli were found in any of the twenty-eight samples of pasteurized milk supplied to schools, nor in the thirty-eight samples of pasteurized bulk creamery skim milk examined. Of the sixty-six samples of bulk raw creamery skim milk, 6.06 per cent contained tubercle bacilli; legislation prohibiting the return of raw by-products to farms was considered essential for the development of areas of tubercle-free herds. A much higher proportion (8.91 per cent) of raw milk samples was found to be infected with *Brucella abortus*, designated supplies showing a higher incidence than milk from undesignated farms. No positive results were obtained with the pasteurized samples.

In a paper dealing with the spoilage of marine fish, the sources and types of bacteria responsible were discussed. The existence in marine bacteria isolated from fish of an enzyme system, triamine-oxidase, which is not generally present in similar bacteria from other sources, was suggested as a basis for differentiating the various species of marine bacteria. The changes in flora which occurred during a 21-day period of storage on ice were also studied. Although anaerobes were not considered to be as important as aerobes in causing spoilage, the types isolated were described, and the isolation of a new serological type of non-pathogenic tetanus bacillus, Type X, was recorded.

With the demand for canned foods for use by the Armed Forces in hot climates, new problems have had to be faced by the canning industry, since storage temperatures may be high enough to permit the germination and growth of spore-forming thermophilic organisms capable of causing spoilage. New methods of control have had to be introduced so as to reduce to a minimum the risk of infection before canning, as it is not always possible to increase the time or temperature of sterilization sufficiently to ensure destruction of the highly resistant thermophilic spores. Difficulty in sterilizing a mixture of meat and vegetable with a relatively high fat content was thought to be due to protection of the thermophiles by the fat. Cases of spoilage in canned vegetables were rare. Difficulty in canning potatoes late in the season was thought to be associated with the use of large tubers, which had to be cut before canning, the sterilization process being inadequate to kill spores at the centre when two cut surfaces came together again.

In a paper dealing with the bacteriology of canned bacon, a novel method of canning was described. Difficulties in sterilization led to a proportion of domed cans. A gas-forming aerobic spore-former capable of utilizing nitrate as a source of oxygen, which was isolated from both spoiled and sound cans, was regarded as the causative agent, although other unknown factors were thought to play a part in the production of gas.

For several years, bacteriologists have necessarily

been concerned with the more pressing practical problems; but at this meeting a refreshing change was noticeable in that a few papers of a more fundamental character were included. A much happier blend resulted, which augurs well for the future of the Society.

Proceedings of the Society, containing full abstracts of the papers read, may be purchased from the Hon. Treasurer, Mr. L. J. Meanwell, United Dairies, Ltd., Ellesmere, Salop.

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE

IT was inevitable that the work of the London School of Hygiene and Tropical Medicine, which has exerted so profound an influence on the teaching and practice of tropical medicine by both British and other medical men, should have been radically affected by the War. The report of the School's work during 1943-44 shows how much its normal activities have been altered. Not only have thirty-six members of the staff been engaged on full-time war service, but also specific war problems have been studied at home, and the School has provided accommodation for members of the staff of the Medical Research Council and of the University of London, who are doing work of national importance. Nor have the School's buildings escaped war damage. Yet, during the year, it has been possible to give courses in tropical medicine to some five hundred Service medical officers and other special courses to 151 students. The acting dean, Prof. M. Greenwood, and the whole School are to be congratulated upon the year's work. It is gratifying to know that it has been possible to do, as well as war work, some fundamental research of a kind which is vital to the very existence of science, yet is, in the words of Prof. Greenwood, "slighted in wartime because the results may not be of immediate technological importance".

Prof. Greenwood refers to the difficulties which the School will have to face after the War, and he doubts whether national post-war needs will allow the School to resume normal teaching until, at the most optimistic estimate, the autumn of 1945-46, perhaps not until a year later. He suggests that the resumption of teaching will not be easy, for the returning staff will have lost touch with the normal problems of academic work and will have to teach a generation trained somewhat hurriedly and under difficulties.

The brief departmental reports indicate the effects of departures of staff for war work and also of the national value of the work which has been accomplished in spite of these losses. Thus the Department of Entomology has been much concerned with work on D.D.T., which was originally brought to the School by a representative of the Swiss firm which placed this remarkable insecticide at the disposal of the British and American Governments (see *Nature*, Nov. 11, 1944, p. 600). Methods of impregnating clothing with D.D.T. for the control of human lice were devised, and this method of applying D.D.T. is now general. The use of D.D.T. for the control of the bedbug is also being studied. Much work has been done on fumigants and mosquito sprays, and a formula for the latter containing D.D.T. has been generally adopted. The physical and chemical problems involved in the control of insects by means of sprays are also being investigated. This Depart-