

aging developments by setting up three training colleges for the training of technical teachers, by facilitating the release of teachers to industry and by encouraging research.

In the discussion which followed the main papers, reference was made to the valuable assistance being given by some industrial concerns to technical education by providing materials and teaching staff. One speaker stressed the need that the selection of vocations should not be made too early; another that small firms had the one great advantage of being able to keep in closer touch with their young workers than can the larger concerns. Listening to all the contributions to the session, one was particularly struck with the obviously growing interest of industry in the education and training of the young worker, and the growing co-operation between employers, organised labour, and the education authorities.

A. P. M. FLEMING

SOCIETY FOR APPLIED BACTERIOLOGY

THE annual general meeting and conference of the Society was held during July 27-30 in the Department of Agriculture, Queen's University, Belfast. Approximately a hundred members and visitors attended the conference.

Agriculture, and particularly dairying, being the principal industry of Ulster, papers on dairy bacteriology predominated among the seventeen contributions submitted to the conference. The first session, on July 27, was devoted to four papers from Northern Ireland workers.

Mr. P. L. Clerkin, of the Bacteriology Division, described the development of the dairy industry in Northern Ireland during the past two decades with particular reference to the methods of bacteriological control. A feature of the Northern Ireland procedure for raw milk is the classification of liquid supplies into three grades designated simply *A*, *B* and *C*. Grade *A* is the produce of tuberculin-tested herds, bottled on the farm and sold raw. It must conform to fairly high bacteriological standards. Grades *B* and *C* have lower bacteriological standards and the bulk of such supplies is pasteurized. To assist the ready identification of the milk by the consumer, coloured labels, bottle-caps, etc., were assigned for each grade. This procedure was of interest since the authorities in Great Britain have consistently masked the identity of graded milk supplies under names which convey little or no information to the consumer. Legislation controlling ice-cream quality was introduced in Northern Ireland in 1938 and the Bacteriology Division advised on suitable hygienic standards. In this field, the Ulster authorities have been in advance of England and Wales.

Drs. Lamont and Kerr and Mr. McGirr, of the Northern Ireland Veterinary Division, submitted a paper on the Stormont technique of tuberculin testing. This technique was based on observations indicating that, in the tuberculous bovine, intradermal tuberculin injections exhibited increased sensitivity to a second tuberculin injection given seven days after the primary inoculation. The diagnostic feature is the increase in skin thickness and *not* the nature of the reaction. Results are now available for 590 animals subjected to the new procedure and afterwards slaughtered for post-mortem examination.

The results showed that the Stormont test had a total error of 3.4 per cent, of which 2 per cent were undetected infected animals.

Lamont and his co-workers have also studied the white blood cell changes in relation to tuberculin testing with particular reference to the new technique. The most striking finding is that the blood reaction with the Stormont technique is very marked, there being a pronounced rise in the polymorph-lymphocyte ratio. The maximum alteration in the ratio appears at varying periods, hence for diagnostic purposes multiple bleeding would be necessary. Using white blood cells, Lamont and his colleagues have succeeded in passively transferring tuberculin sensitivity from the bovine to guinea pigs. These findings offer fairly concrete proof of the presence of the antibody responsible for tuberculin sensitivity. In general, this work supports the thesis recently propounded in a number of American publications that white blood cells and particularly lymphocytes play a very important part in the genesis and manifestations of many immune phenomena.

Dr. Pearson, also of the Veterinary Division of the Ministry, presented a paper on the limitations of penicillin in the treatment and control of bovine mastitis. The North of Ireland experience indicates that clinical mastitis, as encountered by the veterinary surgeon, requires much more individual consideration than is usually given, before penicillin is prescribed. The symptoms of streptococcal and staphylococcal infections are becoming more and more difficult to differentiate, and in Ulster in recent years there has been a definite increase in staphylococcal infections of the udder. In many of these cases little or no response has been shown to penicillin therapy, the organisms being invariably penicillin-resistant. This resistance may possibly have developed during previous penicillin treatment of sporadic mastitis. Strains of resistant streptococci have not become such a problem although such strains undoubtedly exist. Treatment of *Corynebacterium pyogenes* mastitis with penicillin has been found to be a waste of time and money. During recent years there has been a marked increase in the number of samples from clinically positive cases of mastitis, where it has been impossible to detect any causal organisms either culturally or microscopically.

Mr. J. G. Murray, of the Bacteriology Division, contributed a paper on ropy contamination of pasteurized milk. In a recent outbreak the principal source of such organisms was found to be contaminated milk bottles, *Bacterium aerogenes* being the principal contaminant. These organisms were frequently missed when incubated in bile salt broth at 37° C.; but at 22° and 30° C. they were readily detectable. Mixed cultures of slime-producing organisms were also occasionally present.

The second paper-reading session, on July 28, opened with a paper on factors affecting the bacterial population of lake waters by Dr. C. B. Taylor, of the Freshwater Biological Association, Wray Castle, Ambleside. The bacteria present in lake water may be considered in three categories: (a) those washed in from outside sources, of which a large population will ultimately perish although others may find conditions suitable for growth; (b) indigenous bacteria capable of existence in a dilute nutrient solution, as represented by lake water, and able to use for growth low concentrations of available organic matter, such types being probably ubiquitous; (c) bacteria dependent on a solid surface for their

proliferation and found in connexion with plankton cells. Group (a) reflect the amount of pollution in the watershed, and their numbers in the inflowing water are at the maximum for a few hours after heavy rain. Normally they only mix with the lake water to an appreciable extent in winter. Group (b) are types with very weak physiological activity and very low powers of resistance to unfavourable circumstances. An appreciable number are pigmented, yellow being the most common colour. This group is at its most numerous during the winter months. Group (c) are most common during periods when algal cells are present to afford sites for attachment.

Dr. Taylor, along with his colleague, Mr. C. H. Foot, also presented a paper on the most suitable medium for growth of bacteria from water. An interesting point in their findings was the fact that sufficient available nitrogenous organic matter is present in ordinary agar to satisfy the requirements of most water bacteria. Plain agar with the addition of salts, incubated at 20° C. for ten days, reproduced 80 per cent of the colonies found on a standard medium. Beef extract, a concentration of 0.5 per cent peptone and nitrate (NaNO_3) were found to be restrictive to bacterial growth.

Dr. Cunningham and Mr. McLeod, of the East of Scotland College of Agriculture, presented a short paper on the occurrence of *Bact. coli* Type I coliform organisms in the bovine udder. The evidence of the occurrence of persistent coliform infection of the udder in the absence of macroscopic symptoms is weak. In the case quoted by Cunningham and McLeod the numbers of organisms varied between 25 and more than 1,000 per ml. but usually were of the order of a few hundred. The numbers varied only slightly from day to day and also in the fore-milk, mid-milk and strippings. During the course of the investigation the cow went dry, and after calving the same quarter was again found to be infected. The practical importance of the finding is the fact that the coliform test is still applicable in Scotland for designated milk and, in the case in question, the milk supply failed to satisfy the required standards when the milk from the infected animal was included in the bulk milk of the herd.

Mr. A. Rowlands and Mr. W. A. Hoy, of the National Institute for Research in Dairying, Reading, presented the results of experiments with the lye (or caustic soda) method of treating milking machine teat cup clusters and milk tubes. This method is almost universal in the United States; but so far has not been given official backing in Great Britain. The Reading results were entirely satisfactory even under known unsatisfactory conditions. Chlorination of the lye solution was found to be a useful additional safeguard.

In the final paper-reading session, on July 30, Miss M. E. Sharpe, of the National Institute for Research in Dairying, discussed some of the biochemical characteristics of Group D streptococci isolated from infants' faeces with special reference to their tyrosine decarboxylase activity. A definite association was found between tyrosine decarboxylase activity and the biochemical characteristics on which the subdivision into species has been made. *Str. faecalis* and its varieties *zymogenes* and *liquefaciens* show a high tyrosine decarboxylase activity. *Str. durans* has an intermediate activity and *Str. bovis* and the unclassified strains have little or no activity. No strains of Group D streptococci which ferment raffinose produced tyrosine decarboxylase.

Miss E. R. Hiscox, of the National Institute for Research in Dairying, Reading, dealt with some of the factors affecting the ripening of pasteurized milk cheese. Since cheese-making is now largely a factory process, pasteurization of the milk prior to manufacture affords the advantages of standardization, uniformity and elimination of many faults. The cheese, however, as a rule is slower in ripening and lacks the typical flavour of the variety concerned. In Miss Hiscox's investigations raw milk cheese had twice the volatile acidity of the pasteurized milk cheese and few lipolytic organisms were found in the pasteurized milk cheese. Since flavour is probably the combined effect of fat lipolysis and volatile acids, the reason for poor flavour development in pasteurized milk cheese is apparent. The question has now arisen whether flavour can be restored by the use of suitable inoculants, and recent American work has been directed to this end.

Mr. J. Wolf, of the University of Leeds, submitted a short paper on the germicidal properties of tar acids present in producer gas tars. The germicidal properties of these tar acids are rather low as determined by the Rideal-Walker coefficient. A marked increase in the Rideal-Walker coefficient was attained when the tar acid emulsion was chlorinated by various methods. This work suggests that tar acids from producer gas tars might provide a useful source of germicides.

The subjects covered by other papers included a review of the microbiology of composting; the survival of the microflora of milk powders at different relative humidities; a modified acidity test for use on the milk reception platform of dairies, and studies of the thermotolerant bacterial flora of raw milk.

Details of the papers will be published in due course in the *Proceedings of the Society for Applied Bacteriology*, the editor of which is Dr. T. Richards, Department of Agricultural Bacteriology, University of Reading.

FREE ENERGY OF PROTEIN SOLUTIONS

THE annual general meeting and conference of the Society of Leather Trades' Chemists was held on September 17 and 18 at the University of Leeds, Mr. G. Jessup Cutbush, vice-president of the Society, presiding. Included in the proceedings was the delivery of the third Procter Memorial Lecture, by Mr. G. S. Adair, reader in biophysics, University of Cambridge, who spoke on "Recent Work on Osmotic Pressures, Membrane Equilibrium and the Generalized Free Energy of Protein Solutions in the Light of the Work of Procter". Mr. Adair remarked that this year is the centenary of the birth of Henry Richardson Procter, and the occasion was also noteworthy since the commemoration lecture was being delivered in Leeds, where his work was carried out.

Procter's theory of the swelling of gelatin in hydrochloric acid was described by Loeb as one of the most original and ingenious contributions to modern science. The theory gives a remarkably clear and simple account of the large changes in the osmotic pressures of proteins caused by acids and alkalis. Much work remains to be done to elucidate the smaller effects caused by different salts. Recent experimental observations on hæmoglobin in phosphate buffers show an increase in osmotic pressure in