

and simplifying centralized servicing. The floors were planned on a 9-ft. module in a block 200 ft. long and 45 ft. wide. This plan gave a spinal corridor arrangement which again helped in the separation of functions, since it was easy to form the areas at both ends into isolation units. A steel-framed building was chosen with space-frame girders 3 ft. 6 in. deep and 45 ft. span. By this arrangement none of the internal walls is part of the structure, permitting alteration of the working areas as the need arises; it also provides a space between ceiling and floor above in which services are distributed. Vertical distribution of services is through a duct, 10 ft. by 17 ft., which goes right through the building from top floor to basement. The whole of the laboratory wing is air-conditioned, inlet air being drawn in through an electrostatic precipitator and distributed through two separate systems, one serving the east side and the other the west side to give flexibility in taking care of solar gain through the large unopenable windows. A plenum system is used with pressure differences carefully arranged especially in laboratories where micro-organisms are used. All extracted air from areas of possible infection is filtered sterile before being vented to atmosphere. Where necessary, 'hospital' finishes on walls and ceiling are employed to facilitate cleaning and sterilizing; floor coverings are sheet polyvinylchloride in laboratories and hard asphalt in animal rooms and wash-down areas. Stainless steel benches and steel under-bench fittings are employed in all sterile areas and teak tops with wooden furniture elsewhere.

Equipment cleaning and sterilizing are centralized in the basement, where all refuse is incinerated. There are two systems of automatic hoists for handling separately dirty equipment to the basement and returning clean equipment to the requisite floors. All equipment and material passing from the isolation areas are heat-sterilized before proceeding down the 'dirty' hoist. Media-making is centralized and from a food store on the top floor animal diets are delivered to appropriate floors by chutes.

Facilities for work with radioactive labelled substances are provided in a self-contained suite. The

main units of this are a synthetic chemical laboratory, a biological laboratory with separately vented cage cabinets and a radioactivity measurement laboratory. The main radioactive store is in a shielded room in the basement.

The work in the laboratories lies in the fields of pharmacology, toxicology, bacteriology, mycology, virology and parasitology. Some routine testing and standardization work is done on chemical and pharmaceutical production material, such as sterility-testing of injections and bio-assay of insulin. Otherwise the work is investigation, much of it comprising the biological component of research projects involving other research divisions. For example, in the field of parasitology trypanosomiasis is a major project, and chemical substances synthesized in the nearby chemical research laboratories, or new antibiotics isolated in the antibiotic research unit, are screened in the new building by specialized laboratory tests. Those of potential value will undergo more specific tests for activity and, in another unit in the building, for toxicity. Any worthy of clinical or field trial will be passed over either to the Medical Department or to the veterinary research division at Thurgarton, about ten miles outside the city. Work of this kind has produced 'Ethidium' and 'Prothidium' for treatment and prophylaxis of bovine trypanosomiasis. In a similar way the parasitologists working on amoebiasis have contributed to the development of 'Entamide' for the treatment of amoebiasis. Likewise the bacteriologists have collaborated with the chemists and pharmacists in developing a new antibacterial substance, 'Dybenal'.

Team operations of this kind provide much of the impetus for progress in the search for new substances for the treatment of human, veterinary and plant diseases. The new laboratories form a vital link in the chain of investigations between the first conception of a new drug and its final availability to the public. They serve the future in providing the type of working accommodation which the young research scientists of to-day expect and need in order to make their most effective contributions in the fight against disease.

THE BRITISH FOOD MANUFACTURING INDUSTRIES RESEARCH ASSOCIATION

THE British Food Manufacturing Industries Research Association Laboratories at Leatherhead were open to members on September 16 and to invited guests on the following day. The wide range of the research programme of the Association was demonstrated, the exhibits covering work in progress for the eight main groups into which the membership is divided, that is to say, cocoa and chocolate, sugar confectionery, meat and fish products, jams and jellies, pickles and sauces, oils and fats (including margarine and compound cooking fats), bakers' prepared materials and miscellaneous products ranging from table jellies to salted nuts and potato crisps. The work undertaken covers fundamental chemical, physical and bacteriological investigations alongside technological aspects of food manufacture.

For the chocolate industry an item of major importance is the study of the rheology of molten

chocolate. An experimental viscometer was on show which had been designed and built to the requirements of the Association to give measurements of viscosity over a wide range of rates of shear. A method of plotting the viscometric data has been developed which leads to the flow properties of chocolate being expressible in terms of two constants. The glyceride composition of cocoa butter is being studied by chromatographic techniques. Complete separation of the mono-unsaturated triglycerides has been achieved by reverse phase paper chromatography using a non-polar stationary phase and a suitably chosen mobile phase. An investigation into the volatile constituents responsible for the flavour of cocoa and chocolate by gas chromatography is in its initial stage.

The properties of high-boiled sweets, particularly their behaviour on exposure to the atmosphere, is being investigated by means of an apparatus which

permits samples to be boiled under closely controlled conditions at low moisture content. The drying of certain types of confectionery deposited in starch moulds is being studied in two ways with the view of reducing the 'stoving time' necessary for their production. First, the effects of temperature and humidity on the rate of drying of gelatine and starch gums are being studied in a cabinet in which these factors can be closely controlled. Secondly, as corn-starch is used as a moulding medium, an investigation of its equilibrium relative humidity at elevated temperatures is of importance, and an apparatus for carrying this out has been devised and built by the staff of the Association. Other items of research connected with sugar confectionery manufacture are concerned with the properties of glucose used in confectionery (corn syrup), particularly the prevention of foaming on boiling and the tendency for the material to darken on storage.

The programme of research for the meat products group includes biochemical studies on residual tissue respiration and the measurement of oxidation-reduction potential. Colour changes and fading in cooked cured-meats are being studied with the aid of reflectance spectrophotometry. On the technological level, cooking properties of sausages and their colour stability during marketing are being investigated.

The Association's bacteriological laboratory is concerned on one hand with problems connected with bacterial spoilage of food, including the 'blowing' of canned goods, greening in cooked cured-meats and bacterial growth in vacuum-packaged bacon, and on the other hand, with bacterial aspects of the curing and processing of meat. Members are also advised on questions relating to general factory hygiene.

Problems connected with the canning of herrings are being studied by members of the Association's

staff at the Torry Research Station, Aberdeen. The work involves chemical studies of herring flesh and the correlation of changes in the constituents of the flesh with flavour changes and with changes in texture which occur during the canning process.

The Association maintains close contact with horticultural stations concerned with the breeding and development of new varieties of soft fruits and helps the industry to assess their suitability for jam manufacture. The tendency for raspberry seeds to go 'blind', that is to say, become less visible, in jam is another problem which has engaged the close attention of the Association.

Much of the work in connexion with pickles and sauces is concerned with microbiological spoilage, and spoilage organisms from a large number of spoiled packs have been isolated and identified. Problems connected with the production of low-acid pickles involve studies of the pasteurization procedures necessary for a product which will combine adequate shelf-life with desirable appearance and eating properties.

In conjunction with the National Institute for Research in Dairying, an instrument for comparing the 'spreadability' of margarines has been developed. This instrument, the '*Fira/Nird*' extruder, has proved to have applications in connexion with other foods and, indeed, in other industries, where the rheological properties of semi-solid materials are important.

The Association maintains an extensive library of books and periodicals. Research reports and other publications are available only to members of the Association, who also receive monthly issues of abstracts from current scientific and technical literature. Some two thousand items are abstracted in a year.

B. R. KNAPP

THE STRUCTURE AND CHEMISTRY OF PROTEINS

SYMPOSIUM ON PROTEINS AT PARKVILLE, AUSTRALIA

THE intensification in recent years of research relating to the utilization of the primary products of Australia, wool, meat, wheat and milk, and in medical research, resulted in the organization during September 10-11 of a symposium on "The Structure and Chemistry of Proteins", at the Division of Protein Chemistry of the Commonwealth Scientific and Industrial Research Organization Wool Research Laboratories, Parkville, Victoria.

The meeting was well attended, with eighty-five delegates participating. Several overseas visitors were present, including some who had attended a symposium on "Haematin Enzymes" in Canberra, immediately preceding the symposium on proteins.

The topics of the twenty-two papers presented ranged over many of the fields currently being investigated in other parts of the world, a notable exception, however, being studies of amino-acid sequences. This reflects the pre-occupation of Australian workers with the isolation and characterization of protein components from natural products as a necessary first step to a more comprehensive understanding of their structure. Although the complex protein mixtures of these products are the focal

point of much of the Australian research, studies involving purified soluble proteins, such as insulin and lysozyme, plasma albumin and other proteins as well as synthetic peptides are, however, also in progress. The rapid advances which are being made in our knowledge of the amino-acid sequence, structure and behaviour of these classical proteins assist in the understanding and interpretation of the chemistry of the more complex biological systems.

The contributions that X-ray, infra-red and electron-microscope investigations have made in the study of the structural organization of keratin were illustrated by the work of R. D. B. Fraser, T. P. MacRae and G. E. Rogers. The application of X-ray crystallography to the study of the three-dimensional structure of a simpler compound, toluene-*p*-sulphonyl-L-prolyl-L-hydroxyproline monohydrate, was described by J. Fridrichsons and A. McL. Mathieson, and this contribution emphasized the stereo-chemical problem encountered with prolyl residues in a polypeptide chain. The properties of protein complexes of the insect cuticle were described by R. H. Hackman and interest was aroused in the nature of their strong bonding to chitin and quinones. The isolation