

at the Congress, and much experience was gained, which should prove useful for the Conference of 1928.

Before the meetings at Cairo, three days were spent at Alexandria, where the museum, the site of the ancient Canopus, and several other features were visited, chiefly under the enthusiastic guidance of Prof. Breccia.

The overwhelming hospitality shown to the Congress will long remain as a vivid memory. Many

colleagues from various countries met for the first time, and were able to exchange opinions and thoughts on the many delightful excursions, notably on those on the Nile steamers. The warm sun and fresh breeze, the sunsets behind the pyramids, the minarets lighted for Ramadan, the citadel, and most of all the great river of history, form a picture which should make all who were present better geographers than they could be without a knowledge of the motherland of so much civilisation.

### The Preservation of Food.

IT is probable that few people realise the attention to detail which is necessary when articles of food have to travel long distances and yet reach the consumer in a condition which compares favourably with the appearance and character of the same food in the fresh state. Quite apart from the use of food preservatives, the storage of food at ordinary or low temperatures requires attention to a number of factors if success is to be obtained: to the investigation of these factors the Food Investigation Board has devoted a considerable amount of work, as revealed in its report for the year 1923.<sup>1</sup> The report commences with a short account of an expedition to Australia, which was sent out to investigate the cause of a disease of apples known as "brown heart," occurring during the transport of the fruit from that continent to Great Britain. Following a short section on the theory of freezing, come the reports of the six committees set up by the Board to deal with various aspects of the problems of food storage in relation to different types of food. The investigations have been carried on at various places, especially at the Low Temperature Research Station and the Biochemical Laboratory at Cambridge, at the Horticultural Research Station of the University of Bristol at Long Ashton, and in London, Manchester, and St. Andrews. About half of the report is occupied with an account of the investigations of the Fruit and Vegetables Committee, and this section can be conveniently considered together with the results obtained by the Australian Expedition.

It has been found that the following factors affect the keeping properties of stored apples: the soil and locality of the orchard, the age of the tree, the season and the presence of fungi on the fruit; the maturity of the fruit when gathered and its grading and packing; the temperature, humidity, and composition of the atmosphere of the storage chamber. The reports of the Expedition have been referred to in NATURE of February 7, p. 207, and April 18, p. 584. By regulating the temperature and composition of the air of the hold, the fruit can be kept in good condition; on the other hand, ventilation can be too efficient, since the removal of the carbon dioxide produced and the supplying of oxygen to replace that consumed hastens the process of ripening, which may thus be brought about before the fruit reaches the consumer. Hence the ventilation should be so arranged that the carbon-dioxide percentage is kept at about 10.

The problems of storing fruit in Great Britain have also been investigated: cold storage is usually superior to storage at room temperature, but in certain seasons this result may be reversed. Any deterioration which occurs in cold store is usually of a non-parasitic type and similar to that found in Australian apples in transport to Great Britain, whereas in ordinary storage the deterioration is produced by fungal disease. The species of fungi causing this deterioration have been investigated,

together with the path of invasion of the fruit: the spores appear to reach the fruit in the orchard itself, and to prevent this, improved orchard sanitation is necessary; once present, however, their development can be retarded by placing the fruit in cold store. The work of this Committee also includes a number of chemical investigations on the fruit kept in storage, such as carbon-dioxide production, and changes in sugar and pectin content and in acidity, all of which will throw light on the processes occurring in the fruit during ripening and storage.

Although foods of various kinds can be preserved well by freezing, it is not easy so to conduct the processes of freezing and thawing that the food is in an unchanged condition when it finally reaches the consumer. Thus, the yolk of frozen eggs may pass into a pasty state, the change being irreversible on thawing: this can be prevented either by never allowing the temperature to fall below  $-6^{\circ}$  C. or by freezing and thawing with great rapidity. The work of the Fish Preservation and Meat Committees has shown that irreversible changes may occur during the freezing and thawing of fish and meat, unless the freezing is carried out rapidly, as, for example, by immersion of the food material in cold brine; in this case the autolysis of the thawed food is similar to that of fresh meat or fish, whereas if the freezing is carried out in air, fluid separates from the tissues during freezing and drips away on thawing; in this fluid autolysis is rapid, but in the remaining tissues it appears to proceed at what may be called the normal rate. An attempt was made to preserve the fish more satisfactorily by exposing it to ice containing an antiseptic; although the latter hindered the development of bacteria, which still occurred at this low temperature, yet the method was unsatisfactory, since the tissues took up considerable amounts of the antiseptic.

The Oils and Fats Committee reports work on the series of glycerol methyl ethers, the glyceryl glucosides, the constitution of glycogen, and the synthesis of the higher aliphatic acids. The formation of fat by yeasts has also been investigated; the fat is formed from the carbohydrate of the nutrient medium in the presence of oxygen, and more fat is stored if phosphorus is also present in the medium; the phosphate is taken up by the cells in association with the carbohydrate, and it is possible that a hexosephosphate forms a stage in the conversion of carbohydrate into fat. This fat contains the growth vitamin A, which is probably synthesised directly by the yeast cells.

The Canned Food Committee has investigated the chemical changes occurring in fish during the processes of canning and storage. It was found that the presence of soluble tin facilitated the production of certain degradation products of the nature of volatile bases.

The report as a whole is a good illustration of the fact that there can be no dividing line between the two branches of research which are sometimes designated as "pure" and "applied" respectively.

<sup>1</sup> Department of Scientific and Industrial Research. Report of the Food Investigation Board for the year 1923. Pp. iv+77+4 plates+14 charts. (London: H.M. Stationery Office, 1924.) 3s. net.