either direct or indirect, there will be no appreciable difference in the qualitative result of the radiochemical process. However, the difference in the quantitative result may be of great importance from a biological point of view*. Furthermore, it is clear that the general principles outlined above can also be applied to non-aqueous solutions.

* This was very kindly pointed out to me by Dr. W. M. Dale.

[1] Allsopp, *Trans. Faraday Soc.*, **40**, 79 (1944), where a full bibliography will be found.
[2] Dale, Meredith, Tweedie, NATURE, **151**, 280 (1943). Dale, *Biochem. J.*, **34**, 1367 (1940); **36**, 80 (1942); *J. Physiol.*, **102**, 50 (1943); *Brit. J. Rad.*, **16**, 171 (1943).
[3] Eyring, Hirschfelder and Taylor, *J. Chem. Phys.*, **4**, 479 (1936).
[4] Risse, *Ergebn. Physiologie*, **30**, 242 (1930).
[5] cf. Fricke, Cold Spring Harbor Sympos., **2**, 241 (1934)
[6] Arends and Ley, *Z. physik. Chem.*, **6**, 240 (1929).
[7] Franck and Haber, *Sitz. Preuss. Akad. Wiss.*, 250 (1931).
[8] Franck and Rabinovitch, *Trans. Faraday Soc.*, **29**, 120 (1933).
[9] cf. Weiss, *Trans. Faraday Soc.*, **31**, 668 (1935).
[10] Haber and Weiss, *Proc. Roy. Soc.*, A, **147**, 332 (1934). Weiss, *Trans. Faraday Soc.*, **31**, 1547 (1935).
[11] Kailan, *Z. physik. Chem.*, **98**, 474 (1921).
[12] Lanning and Lind, *J. Phys. Chem.*, **42**, 1229 (1938).
[13] Fricke and Hart, *J. Chem. Phys.*, **3**, 60 (1935).
[14] Clark and Coe, *J. Chem. Phys.*, **5**, 97 (1937).
[15] cf. Weiss, *Trans. Faraday Soc.*, **37**, 463 (1941).

FREEDOM FROM WANT OF FOOD

A PUBLIC conference on "Freedom from Want of Food" was organized by the Watford branch of the Association of Scientific Workers and other local bodies on May 20 to discuss the findings of the United Nations Conference on Food and Agriculture held at Hot Springs, Virginia, last year.

Sir Jack Drummond, of the Ministry of Food, who was one of Great Britain's delegates to Hot Springs, described that meeting as the first conference of the peace. It was concerned with the international planning of the production and distribution of food. Forty-four nations were represented and there were scarcely any conflicting views among the delegates. Scientific men considered how their knowledge of nutrition could be applied to the vast problem of malnutrition; agriculturalists considered how best to produce the vast quantities of food the world requires for the adequate nutrition of all; economists considered how the world's trade could be planned to facilitate the most efficient production and distribution of food. Finally, the findings of these several groups was co-ordinated into the United Nations plan for securing 'Freedom from Want'. By international agreement and planning the nations were to produce and distribute food on the basis of physiological requirements.

The problem, Sir Jack said, is terrifying in its magnitude. For example, in culturally backward countries, better nutrition would result in a vastly better survival-rate of children. Hence populations already numerous would only add to their number and thus aggravate the already terrible problem of adequate food supply. In Britain we have made a start in the rationalization of food distribution. Milk was in short supply in the winter now not because it is being produced in lower quantities than before the War. Actually far more milk is being produced, but it is being allocated to those who need it most —nursing mothers and children. Food—the right kind of food—is now regarded as a very important part of preventive medicine. Medical men are becoming more and more interested in how to prevent disease rather than merely how to cure it. Nutritious food is a great preventative of illness.

Mr. P. Lamartine Yates said that four things are necessary in order that practical results should come out of the deliberations at Hot Springs. First, there must be constant surveys into the state of the nutrition of the people and inquiry into what foods are being eaten. Since the War, the Ministry of Food has made surveys and so has its opposite number in the United States. As a result, a great deal of information on diet and nutrition has become available. These surveys must continue after the War if malnutrition is to be avoided. Secondly, propaganda such as that started by the Ministry of Food to show people what they ought to eat and how they can get the best out of their food should be continued and extended. Thirdly, there must be a stable relationship between wages and the cost of food. Poverty is the basis of malnutrition and at present food prices are being kept down by means of a Government subsidy of £200 million a year; this is at 2*s.* a person a week. While Mr. Yates is not in favour of the continuance of such vast subsidies after the War, he thinks that wages and food prices should fluctuate together.

Finally, Mr. Yates urged that someone must be responsible for looking after all this. The United Nations are setting up a permanent international committee in Washington; but on a national scale Mr. Yates believes that a Ministry of Food will still be necessary. We are in for a grim time after the War. Shipping is short and because labour all over the world is engaged in war production there is a world food shortage. Only with difficulty will the United Nations obtain sufficient food to alleviate the worst sufferings of a battered and starving Europe. We must be prepared to put up with rationing of our basic food for a year or two after the War.

There followed a lively discussion and several important points were raised from the floor.

The Conference unanimously adopted a resolution urging that similar conferences should be organized in other parts of Britain to make known to the public the resolutions passed at the Hot Springs Conference. The necessity was accepted for continued rationing of food in Great Britain until such time as the population of Europe is ensured of adequate nourishment, and it was resolved that the administration of relief to enemy occupied countries should not be used either directly or indirectly as a means of exerting political pressure upon the populations concerned.

FOOD PRODUCTION IN INDIA

IN his presidential address to the Section of Agriculture at the thirty-first Indian Science Congress, Ras Bahadur Dr. D. V. Bal presented certain aspects of the present and post-war food production in India.

One of the paramount needs of India at the present time is to lessen the gap between the food produced in the country and the amount required to feed the population adequately. Before the War, home production fell far short of requirements and 2–2·6 million tons were imported annually. The population of India is now much larger than it was a few years ago, but the increase in the area under food crops and normal yields have not been proportionate to the increase in population. The resultant food shortage and occasional famines indicate the urgency of

the need to make India self-sufficient for food, instead of relying more and more upon imports.

To effect this, many factors require consideration, and State aid in various directions is essential. Water shortage can be mitigated by irrigation facilities and by the construction of wells in certain areas. Low yields are often due to the selection of unsuitable types of soil for certain crops. Surveys need to be undertaken to adjust this problem, and to determine where poor arable land would be more profitable if it were laid down to pasture or trees. Soil fertility can be improved by raising the organic matter status by encouraging the preparation of composts from farm wastes, town refuse and night soil. Rotation of crops, including the cultivation of legumes, would serve the double purpose of providing valuable essential foodstuffs and raising the nitrogen content of the soil. The available amount of protein for human consumption is definitely inadequate, and the deficiency can only be made good by extensive growth of leguminous crops.

It is calculated that improvement in the quality of the seed sown would result in an increase of 10–20 per cent of crop, and a great extension of seed farms is called for to produce and distribute improved seeds of various crops. The breaking up of fallow land to increase the arable acreage is not always practicable, owing to the need for maintaining adequate pasturage for cattle, which in India are so important as beasts of burden as well as for milk production. Serious attempts are being made to improve the cattle by better methods of breeding, and a necessary corollary to this is a stepping-up of the amount and quality of the available feed. As it is, the existing supplies of fodder and the area under pasture are inadequate, and to avoid the inevitable competition between the utilization of land for human and for cattle food, it is essential for better methods of cultivation and manuring to be adopted in both cases. If this were done, an increase of 25–33 per cent of human food could be produced from the area at present under the plough, while adequate manuring and appropriate systems of grazing would bring about a corresponding improvement in the supplies for cattle.

Very considerable losses occur in stored grain from weevil attack, at least 1·3 million tons a year being damaged by insects. Rats and spoilage by weather cause further loss, and provision is needed for more adequate storage facilities.

If maximum crop production is to be obtained, it will be necessary for the State to play a part by subsidizing the cultivators, in order to encourage them to use modern methods without the fear of financial loss. The more adequate food supplies thus obtained would so improve the health and strength of the workers as to raise the standard of industrial manufacture as well as that of agriculture.

In order to stabilize the production in India of various crops in general, and food crops in particular, it is essential to consider the long-range problems and prepare a co-ordinated plan to make the country a self-sufficient unit. Experiments are necessary to determine the maximum crop-yielding capacities of soils, special attention being given to the organic matter and nitrogen status of the soils. The standard experiments finally fixed should be conducted simultaneously at various places with different soils and climatic conditions. For this purpose an efficiently trained body of workers is essential, partly to carry out the fundamental research and partly to act as propagandists in making the results known to the agriculturists. After the return of personnel and machinery from war purposes, many men can be used to colonize selected areas and to carry out organized campaigns against diseases and pests of crops, involving the use of specialized machinery, insecticides and fungicides. Many war vehicles could likewise be adapted for power work on the farm for many purposes.

Finally, it is realized that a suitable wage system must be evolved, ensuring a basic wage to the agricultural labourers, rising in accordance with increased costs of living. Such a system, together with certain subsidies to the cultivators, would make for financial stability in the agricultural world.

BIOLOGY OF THE PRAWN LEANDER

LITTLE is known in detail of the habits of the prawns of the genus Leander, and Dr. H. Höglund's monograph* fills a distinct gap. It is an excellent work and a model for those dealing with the biology and life-history of a single species of prawn. *Leander squilla* together with the more important *Leander adspersus* forms a fishery on the west coast of Sweden. The researches have been carried out, partly as field investigations in order to study *Leander squilla* as a member of a stock, its habits, propagation, growth, etc., under natural conditions in the sea, partly as aquarium experiments in order to study such individual processes as mating, spawning, hatching and moulting.

During the winter, the prawns inhabit deep water. When the water in the upper layers has become warmed in the spring, they begin to appear on the shores, and breeding takes place throughout the summer. Temperature is shown to be all-important to migration, breeding and growth, and the time of arrival of the prawns on the shores varies in different seasons according to conditions. In the autumn they return to deep water. Unlike *Leander adspersus*, which, according to Mortensen (1897), migrates to deeper and colder water to hatch out the larvæ, *Leander squilla* apparently remains close to shore in shallow water. The newly hatched larvæ occur in the plankton. It is specially to be noted that the larvæ of both the Leander species occupy the upper layers, whereas all the other carid larvæ of the district frequent the deeper water from 15 to 25 metres.

Both males and females become mature during their second summer, when about a year old. Females may produce two broods in one summer. Larger and older prawns are scarce, but these avoid the nets much more successfully and there is evidence that they may live for three years.

Striking film photographs are given of the pairing, moulting and spawning processes taken in aquaria. The armature of the female thorax and pleopods in the breeding season ("the breeding dress") is very fully investigated and the exact function of each batch of setæ is determined. Most of these setæ are for use only when the eggs are extruded, appearing at the moult preceding spawning and disappearing after the last batch of eggs has hatched out, when another moult takes place.

* "On the Biology and Larval Development of *Leander squilla* (L.) forma *typica* de Man." By Hans Höglund. *Svenska Hydrografisk-Biologiska Kommissionens Skrifter*, Ny Serie, Biologi, **2**, No. 6 (Stockholm, 1943).