POST-WAR AGRICULTURAL RECONSTRUCTION

By G. V. JACKS

Imperial Bureau of Soil Science

THE Division for the Social and International Relations of Science of the British Association held a Conference in London during March 20–21 to discuss problems connected with the post-war reconstruction of agriculture in Europe. Representatives of most of the occupied countries attended, and many addressed the Conference. A remarkable unanimity was evident in the diagnoses of the causes of pre-war agricultural troubles and in the formulation of the desiderata of reconstruction. All agreed that the best hopes for the future lie in the development of small-scale peasant farming concentrating primarily on livestock, fruit and vegetable production, this being a type of agriculture that would best serve to absorb the abundance of available labour, to raise national standards of living and of nutrition, and to enable European economy to play a more harmonious part than hitherto in world affairs.

At the first session, which was opened by Sir Richard Gregory, President of the Association, the need and aims of agricultural reconstruction were discussed. Sir John Russell, from the chair, said that one of the most immediate needs that will have to be satisfied is the provision of fresh seed and livestock for the devastated regions, and he suggested that schemes for collecting supplies should be initiated forthwith, particularly in North America, where the wide range of soils and climate enable all the kinds of seed required to be propagated. Sir John, like all the speakers, sees the best prospects for the successful rehabilitation of European agriculture in a greater production of 'protective' foodstuffs at the expense of cereals.

Mr. Kenneth Brooks gave an account of the European relief activities of the Society of Friends after the War of 1914–18. From the experience then gained he drew four main conclusions: (1) that it is impossible to separate relief from rehabilitation; (2) that short- and long-term policies in agriculture must be developed concurrently; (3) that international co-ordination of monetary and fiscal policy is essential; (4) that the quality of human sympathy in the administrative personnel is at least as important as professional qualifications. A paper by Mr. Mikolajczyk, Deputy Prime Minister of Poland, indicated, by reference to present conditions in his country the immensity of the difficulties which will confront relief workers after the War.

Dr. B. Cubrilović, approaching the subject from the economic point of view, maintained that a planned international economy with human welfare rather than profit as the objective must form the basis of any scheme of permanent reconstruction. Agriculture cannot be planned apart from industry, nor can a plan succeed which does not admit that the welfare of Germany is complementary to that of eastern Europe.

An account of predominantly small-scale farming in a densely populated country was given by M. L. Borremans, from Belgium. Under German occupation, grain production is being excessively stimulated at the expense of livestock and mixed farming. There will be urgent need after the War to restore the

intensive production of protective foods and livestock, and to re-develop the processing industries.

At the second session a discussion on economic problems was opened from the chair by Mr. F. L. MacDougall, who referred to the work of the League of Nations Nutrition Committees, which are now taking up problems connected with post-war reconstruction. He feels that the basis of reconstruction should be the attainment of the four freedoms of the Atlantic Charter, and in particular freedom from want. The most serious nutritional deficiencies have occurred in those countries producing cereals for export. Post-war Europe will require an immense expansion of livestock farming; wines and fruit might advantageously replace wheat as the main export of south-eastern Europe. He thinks that a regional authority, on the lines of the Tennessee Valley Authority, operating independently of political boundaries and with wide powers to integrate riparian activities and co-ordinate them with other forms of production, might be set up in the Danube basin. But the basis of any such scheme must be adequate nutrition, the attainment of which is not precluded by any natural factor from any European country.

Dr. D. Mitrany advocated the cause of the peasantry against the views of the classical and Marxist economists, who affirm that the peasant is an anachronism, on the assumption that the basis of agricultural evolution must be a steadily increasing demand for wheat and other large-farm crops with the growth of industrialization. But since European wheat can never compete successfully with wheat grown extensively in the newer countries, emphasis in Europe is swinging from quantity to quality production, that is, to types of farming pre-eminently suited to peasant proprietorship. The Nazi aim of European self-sufficiency would mean the death of the peasant; the alternative—a higher nutritional standard and co-operation with overseas grain producers—could be achieved by a greater development of mixed peasant farming. Mr. N. Barou described the development of collective farming in the U.S.S.R., where the small private holdings held by the workers have been found to afford a necessary outlet for the individualism which is characteristic of the collective farmer's nature as it is of that of the peasant.

Dr. R. Bičanič said that over-population of the land in eastern Europe has resulted in poverty, exploitation, excessive subdivision of holdings and consequent inability to effect any agricultural improvements. He believes the net effect of the War will be to increase over-population. Suggested remedies include the allocation of more land to the peasants and its more equitable distribution, intensification of mixed farming, the development of rural industries and the undertaking of public works on a large scale. There is need for great speed in making these changes, which will produce revolution unless they are made as part of a carefully planned economy within an international frame.

Mr. P. Lamartine Yates took Danish agriculture as an illustration of how a large population can be supported on naturally poor land at an exceptionally high standard of living. He associated Danish rural prosperity with the high proportion of intensively farmed arable land together with a livestock population much greater than could be fed off home-grown fodder, and in particular with the high level of education of the farmers. The advancement of agriculture in more backward countries depends as much on broadening the basis of education and

raising the standard of intelligence of the people as on any of the economic and agricultural remedies mentioned at the Conference.

The future betterment of European farming was discussed on the second day at sessions presided over by Mr. A. J. Drexel Biddle, the American Ambassador to the occupied countries, and by Sir John Russell.

Miss Margaret Digby recapitulated the causes of agricultural backwardness advanced by speakers on the previous day, and emphasized the military reasons for State policies aiming at keeping an excessive population on the land. She called for a reconstruction programme based on high nutritional standards, more efficient farming, freer trade within a planned international economy, freer movement of populations and a wide development of rural industry.

Dr. L. Feierabend believes that agricultural evolution in Europe must be in the direction of small, individually owned farms working co-operatively. He distinguished clearly between co-operative and capitalistic farming. The primary aim of a co-operative society should be not the making of profits, but "the support of the business of its members", that is, the improvement of the land. He agreed with other speakers that a high standard of education is a necessary element in the success of any co-operative scheme. Mr. S. Malessa stressed the interdependence of agricultural and industrial planning. The problem of rural overpopulation can only be solved by industrial planning to absorb the surplus.

Dr. L. Dudley Stamp outlined the geographical factors determining and limiting the types of crop production feasible in Europe, and advocated planning on a regional rather than on a political basis. Dr. J. Krnjević described the political emergence of the Croatian peasantry, comprising 90 per cent of the population, through the cultural activities of the Croat Peasant Movement.

Dr. J. Hammond gave an account of artificial insemination, which several speakers thought could play an invaluable part in restoring the quality and quantity of livestock. Mr. A. Fjelstad dealt with practical problems of the small livestock farmer in Norway, and Mr. P. H. Pedersen with practical aspects of milk production in Denmark. Both the last two speakers stressed the importance of effective co-operation in small-scale, intensive farming.

QUANTUM THEORY AND DIFFUSE X-RAY REFLEXIONS

By G. D. PRESTON

National Physical Laboratory

THE origin of certain anomalous X-ray reflexions, that is to say, intensity maxima the presence of which cannot be explained by the usual diffraction theory, has recently been the subject of investigation in many laboratories. Some account of the work carried out in Great Britain was given at a discussion held in London on February 6, 1941, and a review of this discussion appeared in *NATURE* of April 19, 1941, p. 467; a fuller account has been published in the *Proceedings of the Royal Society, A*, 179, 1-102, 1941. The progress made in the investigation of this interesting subject in India has recently been reported in the *Proceedings of the Indian Academy of Sciences* of October, 1941, which is wholly devoted, to quote from the cover, to a "Symposium of papers on the

Quantum Theory of X-Ray Reflection and the Raman Reflection of X-Rays in Crystals". This description of the subject-matter reflects very clearly the difference in the interpretation of the phenomena which exists between French, American and British physicists on one hand, and the group of Indian physicists at Bangalore working under the leadership of Sir C. V. Raman on the other.

Before considering the nature of this difference of interpretation, it will be convenient here to indicate the scope of the papers presented to the symposium. Sir C. V. Raman contributes two papers on the theoretical aspect of quantum X-ray reflexion, and in collaboration with Dr. P. Nilakantan provides experimental confirmation from a study of diamond, a crystal the reflexion from which is also discussed by P. Rama Pisharoty. Dr. C. S. Ventakateswaran contributes six papers; one illustrates the change of intensity of the anomalous reflexions at low temperatures and the remainder deal with the patterns formed by rock salt, naphthalene, benzophenone and hexamethyl-tetramine. Benzil is investigated by R. V. Subrahmanian, and aluminium and calcite receive attention from Bisheshwar Dayal, P. Nilakantan and P. G. Nayar. This brief outline of the field covered on the experimental side will serve to show that, whatever differences of opinion exist as to the origin of the reflexions, the phenomena investigated are in fact the same as those studied in France by Laval, in the United States by Wadlund, Zachariasen and Siegel, and in Great Britain at the Royal Institution and the National Physical Laboratory.

It is perhaps worth while here recalling the salient features of the effects observed. When a single crystal of, say, aluminium, rock salt or sylvine is mounted in a beam of X-rays which traverse the crystal in a direction parallel to a cubic axis, a Laue photograph is obtained if the beam consists of 'white radiation'. In addition to the Laue spots, there appears on well-exposed plates a number of streaks, running through the Laue spots, which apparently should have no business there. When the composite X-ray beam is replaced by a monochromatic beam, the usual theory of crystal diffraction tells us that no reflexion should be observed unless the crystal is orientated in a particular way. In general, the condition for reflexion will not be satisfied, except by a lucky accident, and a blank photograph should result. However, in fact, reflexions are observed. They are faint, but have the symmetry proper to the crystal axis in which the incident X-ray beam lies. Examples have been published in the pages of *NATURE* (143, 76 (1939); 147, 467 (1941); 148, 112 (1941)). It is this background of 'non-Laue' diffuse reflexions that is attracting the attention of X-ray crystallographers. To what is it due?

There appear to be several possible answers to this question. The most comprehensive is perhaps to say that the diffuse background arises as a direct result of departures from geometrical perfection in the crystal architecture. A periodic flaw, a regular precipitation of an impurity such as produces a Widmanstätten pattern, and the temperature vibrations of the atoms are all possible and probable causes. It is the task of the experimenter to devise means of identifying the different causes so that use may be made of the machinery provided by the mathematician to enlarge our knowledge of the solid state. Those features of the background reflexions which occur in crystals of pure substances, so that