

observations were criticised in a following lecture by Prof. Giorgi, who proposed also some new experiments as crucial tests between the Ritz-, Einstein, and Fresnel-Maxwell-Lorentz theories.

Prof. McLennan spoke on the spectrum of the aurora and our knowledge of the high atmosphere, Prof. Richardson gave an account of his work on the molecular hydrogen spectrum, Prof. Paschen dealt with some new methods of spectroscopic work, Prof. Duane with the character of the general X-radiation, Prof. Saha with the explanation of complex spectra as interpreted by undulatory mechanics. Prof. Zeeman gave afterwards a very brilliant and complete report on the emission of radiation in a magnetic field, and illustrated his account with many very interesting slides. Prof. Amerio closed the meeting with a report on solar radiation.

THE STRUCTURE OF MATTER AND RADIATION.

Prof. Sommerfeld dealt with the theory of metallic conduction and the Volta-effect interpreted by Fermi's statistics, Prof. Levi-Civita proposed a new theorem on adiabatic invariants, Prof. Debye gave an account of the recent work done by himself and his school on dielectrics and the dipole theory, Prof. v. Laue spoke

on the influence of temperature on X-rays interference, Prof. Eddington on electrical conditions in stars, Profs. Straneo and Gianfranceschi on quantum theory.

Prof. Bohr gave a very clear and detailed report on the actual state of quantum theories; he illustrated the points of agreement and of discordance between the different theories and between theory and experiment, and closed his important speech with some philosophical observations on the atomic world. A general discussion followed, conducted by Profs. Born, Kramers, Heisenberg, Fermi, and Pauli, in which the actual situation of this branch of science was reviewed.

The Congress left a very deep impression on all who were privileged to be present, since it provided so complete a review of the more recent developments in all branches of physical science. The discussions were presided over by Prof. Majorana (president), and by Sir Ernest Rutherford, Profs. Lorentz, Millikan, and Cotton (vice-presidents). At the conclusion, a resolution was passed proposing that the committee which organised this Congress should be made permanent and endeavour to arrange similar meetings in future years.

Annual Visitation of the Rothamsted Experimental Station.

AT the invitation of Lord Clinton, chairman of the Lawes Agricultural Trust, a number of visitors inspected the Rothamsted station and laboratories at Harpenden on Sept. 29.

Lord Clinton, in welcoming the visitors, briefly outlined the purpose of the station, and its special opportunities in the present world-wide agricultural depression. The remedy of reduced production, he said, is a cry of despair, and the sounder way of meeting the situation is to intensify the level of production, at a relatively reduced cost.

Sir John Russell, director, reviewed in detail the recent activities of the station. The new glass houses erected with the help of a generous donation from the International Education Board, Rockefeller Foundation, are in use for the study of plant diseases and the preliminary tests of new fertilisers and accessory materials. The periodical conferences held at the station are proving very successful; they are of two kinds: (a) practical, when some specific agricultural problem is discussed by farmers and the station staff, and (b) expert or technical, in which overseas and foreign workers participate, when the position of some fundamental inquiry, as for example soil reaction, is discussed. These conferences not only serve to disseminate widely the latest developments, but are also of great help to the station in drawing up a well-balanced programme of work.

The subject of crop production and improvement naturally bulks largely in the programme of the station. The improved method of seed inoculation for lucerne is enabling the crop to be grown outside the hitherto restricted south-east area of England, and the demand from farmers for cultures is still increasing. Progress has also been made in the study and control of the elusive factor of quality in certain crops. Prominent among these are sugar-beet, potatoes, and malting barley, in which respectively the sugar content, the behaviour on cooking, and the character of the malt are as important as the actual yield. At least three-fourths of the malting barley used is home grown, but owing to the influence of nitrogen content on the malting quality, farmers are loth to use nitrogenous manures to increase the yield.

Co-operative experiments with the Institute of Brewing have shown, in general, that moderate top dressing of nitrogenous fertilisers can be safely used, and the problem is now being pushed a stage further, by biochemical studies of the grain.

Thanks to mathematical study of the statistical requirements of field plot experiments, it has been possible to use greatly improved systems of replicating and randomising the plots, with a concomitant increase in accuracy of the data of yield. At the same time, by keeping the plots under close examination during the growing season, valuable physiological and ecological information is being secured, both on the relation of soil and climatic factors to plant growth, and on the connexion between the life-history of the plant and its final yield.

In the field, the comparative effects of alternative systems of cultivation are being directly investigated on a variety of crops. Extended use is being made of the new dynamometer in studying the production by implements of a good soil tilth, and the field observations are being closely followed by laboratory studies of the physical and physico chemical soil properties concerned.

Progress has been made in producing synthetic farmyard manure, and the process, developed originally in the Rothamsted laboratories, is now in use all over the world. It has been found of great value in the Empire, particularly in regions where surplus straw, etc., has hitherto been wastefully burnt. In connexion with the purification of the effluent from sugar-beet factories, the earlier Rothamsted work on sewage purification in a filter bed is proving useful.

The new glass houses have enabled the station to add the study of tropical and subtropical plant diseases to its activities. The general endeavour in this work is to aim at preventive rather than curative measures. Nevertheless, the necessity for trustworthy insecticides and fungicides to deal with heavy infestations of disease or pests will remain almost indefinitely, and therefore quantitative investigations on the relation of chemical composition to toxicity, especially of insecticides, are being continued.