

Timber Research.

THE reception by Lord Balfour on July 31 of a large and representative gathering at the Forest Products Research Laboratory marks a definite stage in the development of timber investigations under the Department of Scientific and Industrial Research. Previously accommodated in temporary premises at the Royal Aircraft Establishment, Farnborough, the Laboratory is now in full working order in admirably equipped and well situated buildings at Princes Risborough, Bucks. A photograph of the timber mechanics hall is reproduced in Fig. 1, which gives an idea of the kind of equipment installed in one of the buildings.

Particularly during the War, and following on the demands of aircraft manufacture, the dearth of scientific knowledge of timbers was very manifest. Valuable information was obtained by the Materials Section, under Prof. Jenkin, of the Technical Department of the Aircraft Production Department of the Ministry of Munitions. The threat of a world timber shortage after the War called for urgent action, not only to increase supplies by fresh plantings, but also to promote the utmost reduction of avoidable waste in the uses to which timber is put. It is with the second objective that the Forest Products Research Laboratory is mainly concerned.

For the Laboratory to function effectively, the problem has to be studied intensively from many aspects—pathology, timber physics, wood chemistry, wood technology, seasoning, timber mechanics, wood preservation, wood working—and arrangements made for bringing the results home to the using industries and for encouraging their general application. In a sense, the successful meeting at the Laboratory on July 31 may be regarded as an important piece of 'utilisation work,' since the visitors were given opportunities of visiting the various laboratories, and the clear placarding and labelling of the exhibits enabled them to gain fair impressions of the general organisation and of the investigations in progress.

Mention has already been made of the various sections in which the programme of the Laboratory's work naturally falls. The general research work covers the study of decay caused by fungi and attacks by insects; the analysis of wood and its derivatives; effects due to seasoning, wood preservation, etc.; the examination of the relations of water and heat to wood. Then come problems such as the basic principles of seasoning; the evolution of appropriate mechanical tests and the interpretation of the results; antiseptic treatments against decay; which are subsidiary to full scale work on kiln design, strength comparisons, and wood preservation. In certain of these sections the Laboratory works in close association with the Forestry Commission, the Imperial Forestry Institute at Oxford, and with recognised authorities on particular subjects at the Imperial College of Science and Technology, University of St. Andrews, and the Imperial Institute.

Progress has already been made on a number of

specific lines of investigation, and a description of some of them may be of interest.

An examination has been made of the decay occurring in Sitka Spruce timber. Several wood-destroying fungi have been isolated, and the principal one responsible for most of the decay has been identified as *Trametes serialis*. This fungus has been grown in pure culture and its life history studied. The method of attack on timber and the character of rot produced have been carefully observed. A full study of the physiology of the fungus, including the water relationships, is proceeding; in addition, it is proposed to determine the effects of the fungus on the mechanical strength of the wood after varying intervals of time.

Another interesting and important problem which has been attacked relates to furniture-destroying insects, notably *Lyctus* beetles. An investigation

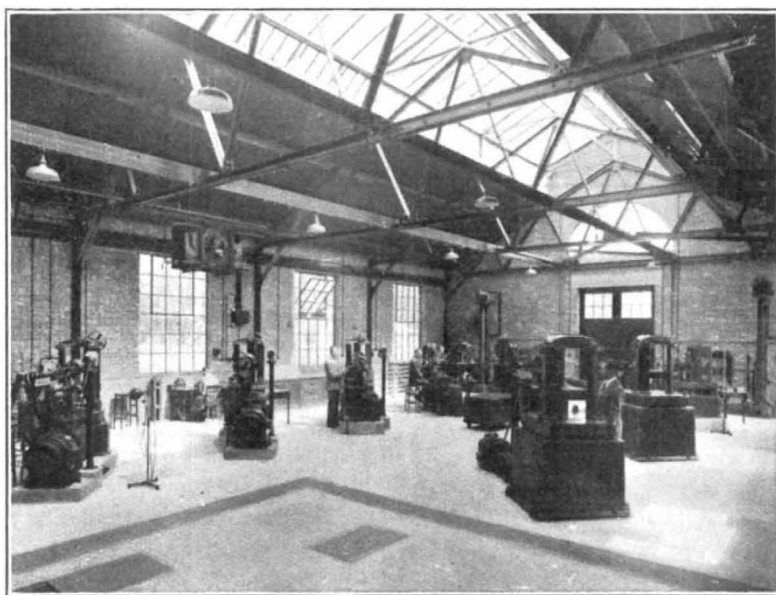


FIG. 1.—Timber Mechanics Hall Forest Products Research Institute, Princes Risborough.

has been made into the losses caused by these beetles on timber in store. The work has reached a stage at which practical methods can be given for ridding the timber of this pest by a steam sterilisation treatment in the kiln. It has been shown that sterilisation is effected when the timber is maintained in the kiln for 1½ to 2 hours at an overall temperature of 130° F. and humidity 100 per cent. Apparently there exists a definite relationship between the diameter of the pores of a wood and its susceptibility to *Lyctus* infestation; when the diameter of the vessels of a wood are less than that of the *Lyctus* egg, it is not attacked by this insect. The moisture content of the wood is also a determining factor, and results to date indicate that infestation does not occur when the moisture content falls below 8 per cent. The experiments are being continued in order to ascertain whether lower conditions of temperature and humidity, combined with longer periods of treatment in sterilising kilns, cannot be used to kill *Lyctus* in all its stages. The next problem is to secure immunity for the timber from further attack. Any method, to be practicable, must not spoil the colour

of the timber, must be cheap and easily applied. Preliminary work on this aspect of the investigation is in hand.

An allied 'project' is concerned with the losses caused by Anobiid beetles on timber in buildings and in furniture. Two insects are being specially investigated—*Anobium punctatum* (Common Furniture beetle) and *Xestobium rufo-villosum* (Death Watch beetle). Detailed studies of the biology of both insects are in progress, and the mode of egg-laying and the rate of development of the larvæ are being determined. Later it is proposed to study the effect of varying temperatures and humidities on the length of the life-cycle of both species, and to ascertain whether preferences are exhibited by the insects for different species of timbers. It may be, also, that there exists some relationship between fungal infection of timber and progress of Anobiid attack.

Standard tests are being developed of antiseptics for use in wood preservation generally and in particular for preservation against insect and fungal attack. Timbers treated with various antiseptics at different concentrations are being exposed, and records of results will be kept over long periods.

Microscopic examination is being made systematically of wood structure. Much work is being carried out on the structure and identification of British hardwoods. The variation in structure of home-grown timbers is being studied as a necessary preliminary in forest products research problems. Work has been begun on elm, ash, and oak.

Another main line of experimental investigation concerns the factors influencing and controlling the movement of moisture and heat in timber, with special reference to their bearing on timber seasoning. Several methods of determining heat movement have been tested, and attention is at present being directed to thermal diffusivity as distinct from conductivity. As a result of the experiments carried out to date, considerable information has been obtained as to the rôles that temperature, vapour pressure, and rate of air circulation play in influencing the moisture movement in wood and in its drying. Two 'Technical Papers' on the subject have been published. The original intention was to proceed to estimate the effect of such factors as structure and density, in order to assess the seasoning qualities of different species of wood and to obtain data for optimum seasoning conditions. Recent experience is showing, however, that the problems of case-hardening, shrinkage, and collapse with related warping are of greater importance than was at first realised. Experiments are also in progress to determine the degree of hygroscopicity of different timber, with the view of ascertaining means of reducing the troubles arising therefrom.

An incidental problem is the determination of the most suitable moisture content for timber to be used in the manufacture of various kinds of furniture

and in decorative work. Seasonal variations of moisture content in timber are under close observation.

The testing of the mechanical and physical properties of timbers naturally occupies an important part of the working programme of the Laboratory. Mention may specially be made of tests of small clear specimens designed to give a measure of the inherent fibre strength of the species and to provide a basis for comparing one species with another, for determining the influence of defects in larger samples, and for computing the effect of rate of growth, density, and moisture content. Fourteen consignments of home-grown timber have been collected, nine of which have been tested in the green condition, and four, air dry. More than 18,000 tests have been made.

Tests have been made of the seasoning and mechanical properties of timber used, or proposed for use, as pit props; it has been shown generally that home-grown species bear favourable comparison for the purpose to imported timbers. Mechanical tests have also been made of plywoods. In connexion with tests on structural timbers, preliminary data are being obtained for beams and joists; it is hoped in due course to evolve tables for structural grading, etc., which will be of great utility in specifications for building work.

Investigations are being made into the kiln seasoning properties of the commoner commercial timbers. Those into Corsican pine are completed; those into oak, beech, and common elm are proceeding. Parallel mechanical tests are also being made on kiln-seasoned material as compared with control samples.

Data relating to heat quantities and air circulation figures are being collected whenever possible, and observations are being made on the behaviour of the existing kilns, with a view to the construction of a special kiln for the study of factors influencing kiln design. A model experimental chamber is in operation. A report has already been issued regarding the essential principles of kiln seasoning of timber.

An interesting investigation has been carried out on the briquetting of charcoal manufactured in portable and semi-portable kilns, with the object of enabling the more profitable utilisation of waste timber in factories, etc. Following the production of satisfactory charcoal in the portable kilns operated at the Laboratory, arrangements have been made for briquetting trials on a commercial scale.

The above notes will serve to indicate the scope of the general programme of work of the Forest Products Research Laboratory. It should, however, be emphasised again that the scientific and technical work of the Laboratory is being linked as closely as possible with practice, and that continuous efforts are made not only to spread information as it becomes available, but also to arouse and maintain the active interest of the industry in new ideas and new operative methods for the economical utilisation of timber.

The Scott Polar Research Institute.¹

By Dr. H. R. MILL.

IN welcoming visitors from all the countries represented at the Congress to the temporary premises of the Polar Institute at Lensfield House, the committee of management trusts that the extreme youth of the Institute will be held to excuse the greater prominence given to hopes for the future rather than to memories of the past.

The Scott Polar Research Institute is neither a

¹ Substance of address at a reception given by the Scott Polar Research Institute of the University of Cambridge to members of the International Geographical Congress on July 21.

teaching body nor a society seeking a numerous membership. Its aims are to encourage polar research by supplying information and advice to intending explorers, affording opportunities for study and assisting in the organisation of expeditions, and for this purpose to concentrate in one place all existing knowledge of the polar regions and subject it to expert criticism and cataloguing; above all, to maintain communication with all polar explorers, investigators, and students without any restriction or qualification.