that it proposes anything quite so drastic as the dedication scheme envisaged by the Forestry Commission in Great Britain.

A third paper of interest, by Marianne Lekander, treats of the invasions of insect pests in the Swedish forests during 1741–1945. The author has studied the whole of the literature—the forestry and entomological, administration and departmental reports of the State and reports of forestry conservators and the institute of research—and the paper appears to be an admirable piece of work. Mass invasions or slighter ones occurring more often are classified for each species of insect in a chronological order and are given for each of the forest conservancies in each province. A tabular statement is given at the end of the paper enumerating the chief pests of the forests during a period of fifty years, 1896–1945. An alphabetical list of the insects mentioned is given in Latin and Swedish.

Another paper, by Lars Tiren, is "On Clearing Spruce and its Significance for the Reforestation of Spruce Forest Clearings in Northern Sweden". The main objective was to study the nature and abundance of the seed and resulting seedling growth occurring from the spruce trees left standing in the forests in northern Sweden, and a good opportunity occurred in the good spruce seeding year 1942–43. In these northern spruce forests the future crop largely depends upon the poor type of tree called 'clearing spruce' or 'remnant spruce'. Even though these trees often appear very insignificant and inefficient for the purpose required, they do in effect function as seed-bearers, though often assisted by contributions from any forest border trees surrounding them. Briefly, the study has shown that some artificial help can assist, which may consist of raking under the trees or burning under them, providing a sufficiency of good trees remains to assist the others. Much further research requires to be carried out, which should prove of value to other parts of the world where forests growing under the same type of conditions exist.

CHEMICALS IN FOOD

THE United States Congress established in June 1950 a Select Committee, known as the Delaney Committee, which was given the task of assessing the dangers to public health arising from the increasing use of chemical substances in food manufacture and from the presence in foods of residues from the pesticides now widely employed in agriculture. This Committee has issued its preliminary findings* together with a full report† which is an important document embodying in its eight hundred pages the views of some seventy scientific workers, physicians and industrialists who appeared as witnesses.

The Committee heard the striking evidence submitted by the officers of the Food and Drug Administration, who stated that 704 extraneous substances were thought to be in use; of these, only 428 were considered harmless as normally employed, leaving a further 276 of which the safety was open to question. Attention was directed to a conflict of opinions regarding the suitability of various compounds. There are several which were at one time considered harmless and which found a place among food ingredients; later investigations established their toxic character. In this category are *p*-phenetyl urea, used for more than fifty years as a sugar substitute; chloracetic acid, a preservative for wines; and thiourea, an anti-browning agent for fruits. The dyestuff butter yellow served for many years as a food colour before its carcinogenic action was recognized, and lithium chloride was considered safe until it was shown to be fatal to persons living on a low salt (sodium chloride) diet.

The above substances are no longer employed, but there are others in use which are the subject of controversy; and although those materials which act as preservatives, anti-oxidants and mould inhibitors are added to food in very small quantities, others such as the synthetic emulsifiers used in the United States baking industry may be present in considerable amounts. Many witnesses pointed to the dangers that could result from the incorporation of these newer ingredients in a staple commodity such as bread.

Consideration was given not only to those substances which are added deliberately to foods to produce some desired effect, but also to others which may become associated with foodstuffs by accident. Among these are the surface-active agents employed in the cleaning of food utensils and machinery, and the pesticides, such as DDT, which may adhere to crops and find their way into foodstuffs. The very properties which make these substances so effective in the control of lower forms of life may lead to their absorption by plant tissues and to their injurious effects on higher animals.

Testimony was given regarding the difficulties experienced in devising suitable methods for the accurate estimation of many of the newer synthetic substances, especially at the low levels at which they are likely to occur in foods. Sound practical analytical methods are essential if there is to be adequate control of the degree of contamination of foods and if the pharmacological properties of the compounds are to be investigated.

Many scientific workers stressed the necessity of carefully designed toxicity studies. They pointed out that, in the past, the main emphasis had perhaps been on acute toxicity tests to discover the levels at which a substance would produce deaths in experimental animals within a short period of time after it had been given by mouth or by injection. In the light of experience gained over the past decade more detailed investigations are required—feeding experiments at different levels on several species of animals over a period of perhaps two years, together with a thorough study of the metabolism of the substance under discussion, its effects on the tissues of the experimental animals and its relation to growth, reproduction and lactation. The results of some of these *chronic toxicity* studies were quoted; there were substances which appeared to be harmless in short-term experiments—in that they did not cause death immediately following ingestion—yet small amounts accumulated in the body and ultimately produced permanent injury.

Experiments on the chlorinated hydrocarbon DDT were described which demonstrated that DDT appeared in the flesh of chickens, cows and sheep which had eaten crops sprayed with the pesticide. It was present also in eggs and in milk. Moreover,

* Investigation of the Use of Chemicals in Food Products. 1951. Union Calendar No. 1139. Report No. 3254. (U.S. Gov. Printer, Washington, D.C.)

† Chemicals in Food Products. Hearings before the House Select Committee. 1951. (U.S. Gov. Printer, Washington, D.C.)

lactating cows in a byre treated with DDT secreted in the milk within forty-eight hours quantities of 2 parts per million. This amount was shown to be significant in that DDT when fed to laboratory animals was stored in the body fats; diets containing as little as 5 parts per million produced liver injury in rats. Other pesticides are even more highly toxic, and it was suggested that some should be banned completely from use on food crops.

Many other topics were reviewed by the Delaney Committee; for example, the impairment of the nutritive value of prepared foodstuffs through the replacement of naturally occurring constituents such as fat by synthetic materials which cannot be utilized by the body and which may interfere with the normal absorption and metabolism of nutrients. Information was also given regarding the unforeseen consequences of the introduction of synthetic hormones into poultry husbandry; mink fed on the offal of chickens treated with hormones became sterile, an observation which has naturally led to a demand for a full inquiry.

There is now a substantial body of public opinion in the United States which favours legislation to deal with the various problems outlined above, and this proposal is supported by members of the medical profession and by others working in the fields of biochemistry and nutrition. The central issue under discussion is how to frame suitable legislation which, on one hand, will provide adequate protection for the consumer and, on the other, will also give freedom for new and legitimate developments in agriculture and food technology.

FRANCIS AYLWARD

MECHANICAL ENGINEERING RESEARCH ORGANIZATION

REPORT FOR 1947–50

UNTIL recently it was clear that in Great Britain research in mechanical engineering suffered from lack of any central co-ordination: a considerable amount of work was being done in government, industrial and university research laboratories, but in some branches the researches carried out were insufficiently fundamental, being directed towards the solution of immediate problems. A new organization was clearly needed, both to conduct basic research not carried out elsewhere and to serve as a focal point for all other research work. To meet this need the Mechanical Engineering Research Board was appointed in 1946 to advise on the organization and equipment of the government-sponsored Mechanical Engineering Research Organization, to which funds amounting to some £300,000 a year were allotted.

The first report of the director of the Organization has now been issued*. It is prefaced by a report of the Board, which reviews the broad issues involved and the progress achieved in the establishment of this new Organization. It gives a clear and concise account of the whole situation: the objectives, the resources available, the constructional work complete or projected, the research now in hand or planned, and the collaboration with other research bodies.

A new organization of this type cannot grow without any roots: it is necessary to train the teams who will work together, before they can be transplanted to other premises. There must be a proportion of well-established lines of research in addition to those that are quite new. In this case the greatest debt is to the Engineering and Metrology Divisions of the National Physical Laboratory, from which the nucleus of the Mechanical Engineering Research Organization has been formed.

It was decided, on broad national grounds, that the new laboratory should be situated in Scotland. The site adopted is at East Kilbride, near Glasgow, together with temporary premises a few miles away at Thorntonhall, and sufficient laboratories and essential services are now ready at East Kilbride for research work to begin there. The establishment is being organized into seven main divisions, the work of each being under the supervision of a committee of experts from industrial and other research laboratories. In addition, a considerable amount of extra-departmental research is being undertaken in collaboration with each division.

The first director of the Organization was Dr. G. A. Hankins, formerly superintendent of the Engineering Division of the National Physical Laboratory. Since his death in November 1950, Dr. D. G. Sopwith, his successor at the National Physical Laboratory, has been in charge on a part-time basis (see p. 769). His report gives a fairly complete picture of the work done during the first three years of the existence of the Organization. In the early stages the main emphasis was naturally on the formulation of future research programmes; this changed to the detailed design of laboratories and equipment and the recruiting and training of staff. The total staff in 1948 numbered only seventeen, but by December 1950 the scientific and technical staff had increased to sixty-three, together with a roughly equal number of ancillary laboratory, office and industrial staff.

The progress of the various researches and future work planned by each division is detailed, together with an account of extra-departmental projects. Even an outline of all the work undertaken or contemplated is impossible in this article. It ranges from the comparatively familiar tests and techniques used in the testing of materials to the development of the use and analysis of mechanisms, a branch of engineering science which has remained practically static for some fifty years. It is apparent how closely allied many of the researches are to other fields of scientific, as opposed to technological, research; it is, of course, quite impossible, and undesirable, to make any such distinction. It is intended, however, that the work of the Organization shall be carried through to the development stage, should it be considered essential to do this in order to make apparent the industrial advantages to be gained from the results of basic work.

This publication is likely to prove of interest to those engaged in scientific research of any sort, and it can be recommended as giving a clear idea of the progress and aims of the new venture. No longer can it be maintained with justice that technological research in Great Britain lags behind general scientific research, either in relation to its fundamental nature or to the breadth of outlook of those concerned with it.

R. H. MACMILLAN

* Department of Scientific and Industrial Research. Report of the Mechanical Engineering Research Board, with the Report of the Director of Mechanical Engineering Research for the Period May 1947 to December 1950. Pp. 39+8 plates. (London: H.M.S.O., 1951; 2s. 6d.)