

The last paper on the programme was "Vegetable Oils as Petroleum Products Substitute", by Dr. M. L. Khanna, National Physical Laboratory, New Delhi. The paper was read by Mr. A. S. Gupta (National Chemical Laboratory). It described the work carried out by the Council for Scientific and Industrial Research on the utilization of vegetable oils as lubricants and diesel fuels. These oils can also be used for lubricating greases.

It was tentatively decided that the Symposium on Oils and Fats will be held next year at Bombay under the auspices of the Oil Merchants Chamber, though a warm invitation had also been received from the Oil Technologists Association, Kanpur.

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## NEW ZEALAND DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

ANNUAL REPORT FOR 1950-51

THE twenty-fifth annual report\* of the Department of Scientific and Industrial Research, New Zealand, covers the year ended March 31, 1951, and includes the Minister's statement, the Secretary's report and the reports from the branches, research committees, research associations, etc. The net expenditure for the year was £903,550, of which £316,296 was incurred in research investigations, £184,318 for the Dominion Physical Laboratory, £127,740 for the Dominion Laboratory, £78,933 for the Geological Survey, and £57,355 for the Information Bureau, Scientific Liaison Services and miscellaneous services. Grants to universities and agricultural colleges amounted to £35,538, and to research associations to £25,959. Of a total staff of 1,010, there were 386 professional and 450 technical officers.

During the year the Department's activities in geophysics were grouped under a Geophysics Division, and a major activity of the year was the search for suitable geological structures in the Wairakei thermal region which will enable the geothermal steam and hot-water resources of the area to be utilized for power and industrial purposes. Although good progress has been made in the exploratory work, much further research will be required before utilization is possible. In association with the Geological Survey and the Geophysics Division, Dr. E. Lehner, consultant to the Anglo-Iranian Oil Co., examined all likely petroliferous regions, and his report on their potentialities as sources of petroleum is under consideration. The Secretary's report also emphasizes the economic value of some of the research findings of the Department. Thus the persistent efforts of the Botany, Soil, Plant Diseases and Entomology Divisions have now defined the dreaded yellow-leaf disease of phormium as a virus disease transmitted by the insect *Oliarus atkinsonii*, thus clarifying the attack on the problem by plant breeding and management practices. Studies of the New Zealand grass-grub, which causes very serious losses annually, have shown how this pest can be controlled economically with DDT and 'Gam-mexane'. Research on varieties, diseases and fertilizer treatment of the tobacco crop have contributed

to an increase in average yield of dried leaf per acre from 659 lb. to 1,155 lb. in four years, or £74 8s. per acre at the current basic average price of leaf.

The researches of the Fats Research Laboratory and the Dominion Physical Laboratory have contributed to the establishment of a fish liver-oil industry worth £200,000 annually and utilizing material previously neglected. Pasture research at the Grasslands Division has yielded strains of grasses and clovers and a system of management enabling the production of 12-16 thousand lb. dry matter per acre annually. Since a figure of 4,000 lb. is required to yield 200 lb. of butter-fat per acre, the potential value of this increase to the New Zealand butter industry is obvious. The value of short-rotation ryegrass seed developed by this Division is estimated at £150,000 annually over the last three years, apart from the grazing value of the ryegrass. Disease control investigations by the Plant Diseases Division are estimated to have effected annual savings of £250,000 to the grazier through reduced losses in dry rot of swedes; control of mealybug of glasshouse grapes with DDT has yielded annual savings of £18,000 and of eelworm and verticillium wilt of tomatoes in Auckland glasshouses, £80,000. The savings effected in interior renovations of plaster-lined houses by control of black-mould are estimated at £42,000 annually.

From the reports from branches, only a few points can be selected for mention. Meat research on production of dehydrated meat in large-sized pieces with a more acceptable texture than mince has yielded a product with a well-distributed moisture content, of acceptable appearance and palatable when cooked, and a pilot plant is projected. The study of resinous constituents of exotic pines was continued in co-operation with the New Zealand Forest Service. The programme of simultaneous measurements of absorption of radio waves reflected by the ionosphere obliquely (in passage between Awarua and Lower Hutt) and vertically (at Christchurch) was completed. In the Fats Research Laboratory it has been established that the more highly unsaturated acids are important in connexion with the onset of rancidity in butter-fat, and in the C<sub>18</sub> series the triene acid present is linolenic acid, the main fatty constituent of pasture. Branched-chain fatty acids also occur in butter-fat. From April 1, 1951, the Geophysical Observatory, Wellington, has been renamed the Oceanographic Observatory, and studies of marine conditions in New Zealand waters have commenced. The Plant Chemistry Laboratory has continued its work on the synthesis of leaf protein from nitrate and ammonia derived from the soil with a further microbiological and chromatographic study of the amino-acids in leaf sap. The Seismological Observatory reports that seismic activity during 1950 was most intense during the first three months, the severest earthquake of the year occurring on March 1, 1951, in the region between Taupo and Waikaremoana. The Wheat Research Institute studied the sugar needs of fermenting doughs and found that these are much higher for long dough processes than for short ones. The Cawthron Institute completed its survey of hop soils, continued its studies of the role of trace-elements in Nelson crops, and again surveyed hop-gardens for the presence of black root-rot.

The Pottery and Ceramics Research Association was expanded to include the heavy clay products industry. Trials at the Dairy Research Institute showed that addition of 0.005 per cent of the anti-

\* New Zealand. Twenty-fifth Annual Report of the Department of Scientific and Industrial Research. Pp. 80. (Wellington: Government Printer, 1951.) 1s. 6d.

oxidant, nordehydroguaiaretic acid, reduced the amount of oxidation in butter during eight months of storage, but without improving the grade of butter. Of twenty overseas strains of streptococci examined, none was suitable for use as a cheese-starter in New Zealand. The Woollen Mills' Research Association made comparative tests with six worsted oils and also found that 'Lissapol N' in scouring removed the mineral oils satisfactorily. It was also found that 0.01 per cent of copper was the maximum amount that could be tolerated on the wool in dyeing, and even this amount noticeably affected weak dyeings of sensitive dyes.

## QUALITY CONTROL OF LINOLEUM

ON January 31 the Linoleum Research Council, which has only been in existence for not quite three years, held its second symposium at the Grosvenor Hotel, London. The subject on this occasion was "Quality Control" as applied to linoleum, and not only was the industry itself well represented by the gathering of its technical men but also a number of visitors from other related industries were present. The meeting was opened by Dr. K. Turner, chairman of the executive committee, who said that this meeting was a direct result of the first symposium, entitled "The Rheology of Unmatured Linoleum", which had been held in the same place two years ago and which had been sufficiently successful to merit making these meetings a regular affair. He then handed the meeting over to the superintendent of research, Dr. S. R. W. Martin.

Five papers were presented, and as preprints had been circulated well in advance it was possible to devote most of the time of the meeting to a discussion, which was extremely stimulating and constructive. The first paper, by Mr. F. T. Walker (Messrs. Michael Nairn and Co.), was entitled "Dimensional Changes of Linoleum with Varying Humidity", and outlined the effect of water absorption on the cubical expansion of linoleum at normal temperatures. It was shown that the expansion of the linoleum is directly related to the amount of water absorbed. The effect contributed by the various ingredients of linoleum has been measured, and the fibrous fillers—cork or woodflour—have been shown to be almost entirely responsible. Various physical and mechanical factors which can influence expansion due to moisture absorption were discussed, and the superficial anisotropy of the linoleum sheet resulting from calendering demonstrated.

"The Indentation Machine as an Indication of the End Part in the Process of Maturing Linoleum" was discussed by C. W. Falkner (Linoleum Manufacturing Co., Staines) as an introduction to the study of the whole subject of mechanical testing as an aid to accuracy in judging the process of maturing which forms the final stage in the manufacture of linoleum, and a comparison was made between the indentation test and chemical tests, and new tests in respect of quite new and novel instruments. A more precise description of results obtained by the use of such a new testing device was discussed by P. J. Humphris (Linoleum Manufacturing Co.) in a paper entitled "The Rigidity Modulus of Linoleum". A large-scale rigidity machine was described, and attempts have been made to correlate results obtained from this

machine with maturing times. There are clear indications that the modulus of rigidity in the case of linoleum is a sensitive property of some structural significance.

An alternative method of assessing the maturing stage of a linoleum was described by Messrs. J. C. Lawson, T. McQuillen and G. D. Rack (Jas. Williamson and Son, Ltd.) in a paper entitled "Some Experiments on the Application of Resilience Testing to Linoleum". Various common methods of measuring resilience of similar materials were discussed, and it was shown that a bouncing-ball technique and also a wheel-rebound test have given valuable results which may be a guide to the correct end of a maturing process.

An interesting paper, which was possibly outside the narrow subject of the symposium but nevertheless of interest to all present, was given by Dr. F. C. Harper (Building Research Station) on "The Measurement of Slipperiness of Floor Finishes". This described methods which have been used by various investigators for measuring slipperiness and showed how the problem can be simplified if more information is available about the mechanics of walking.

The meeting was concluded with a general summing up by Mr. A. G. Ward (director, British Glue and Gelatine Research Association). Dr. Martin thanked the company and suggested that, by the organization of such meetings where members of the industry can meet together and exchange information of material benefit, the Linoleum Research Council is amply fulfilling one of its functions by acting as a scientific centre for the industry.

## PRODUCTIVITY IN THE PACKET FOODS INDUSTRY

### REPORT OF THE ANGLO-AMERICAN COUNCIL ON PRODUCTIVITY

THE findings and recommendations of the productivity team representing the British packet foods industry that visited the United States last year are of interest to a wider field than those specifically concerned with food and its packaging. The recently published report of the team\* does not endeavour to tell the British food industry how it should run its business, nor does it suggest that everything done in the United States is necessarily better than in Great Britain, the general conclusion appearing to be that, if in Britain there were the same unlimited supplies of materials, there would indeed be little difference in efficiency of either the foodstuffs prepared or in the quality of the packaging. Indeed, in this latter respect it seems that many of the undoubtedly superior packages and packaging methods used in the United States result from the ready availability of materials as well as the greater development of self-service stores which have called for more attractive packs in order to tempt purchasers.

Many interesting facts are presented in the report. One learns that food and agriculture in the United States is a "25 per cent industry"—one-fourth of the American income is spent on food, and the industry employs one-fourth of American workers. In the

\* Productivity Team Report: Packet Foods. Report of a Visit to the U.S.A. in 1951 of a Productivity Team representing the British Packet Foods Industry. Pp. xii+71+9 plates. (London and New York: Anglo-American Council on Productivity, 1951.) 4s. 6d.