

Erna Grossbard shows that an antibiotic substance is produced by *Penicillium patulum* on sterilized soil to which a source of carbohydrate is added. *Aspergillus terreus* produced a less-effective antibiotic under similar conditions. One result of probable significance in practice is that *Streptomyces griseus* antagonizes *Phytophthora parasitica*, a parasite of tomato seedlings and roots.

A detailed paper by E. R. Speyer and W. J. Parr gives the life-history and control of the tomato leaf-miner, *Liriomyza solani*. They discuss control at the seedling stage by DDT and gamma-benzene hexachloride, the effect of nicotine upon the larvæ, and of pyrethrum powder upon the adult flies. A series of tests of various insecticides in the laboratory and greenhouse has been made by W. H. Read. They include results from systemic insecticides and indicate that *bis* (*bis*-dimethylamino) phosphonous anhydride, though poisonous, is very promising for the control of aphids or red spider on carnations.

Chemical researches include nitrification studies by G. W. Winsor, steam sterilization studies by O. Owen and J. N. Davies, and the tabulation of mineral deficiencies, mostly on chrysanthemums. This is all long-term work, and the final results should be as interesting and illuminating as are earlier results from this section.

WATER POLLUTION RESEARCH BOARD

ANNUAL REPORT FOR 1949

THE Water Pollution Research Board is the body, coming under the Department of Scientific and Industrial Research, which is responsible for research on water pollution in Great Britain. Mr. H. W. Cremer is chairman of the Board, and Dr. A. B. Southgate is director of the Research Laboratory, situated in Watford. One of the functions of the Board is to give friendly advice to any who are perplexed with problems of water pollution; the report for 1949*, which gives a synopsis of its recent activities, affords abundant evidence of this and shows that help is not confined to the British Isles. Where a problem presents features of special interest or importance, the Board sends its research officers to carry out *ad hoc* experiments and extend these to the stage of the pilot plant.

The city of Tehran draws the bulk of its water supply from the River Karaj, and the Board reports that this supply can be made safe by sedimentation with ferric chloride in upward-flow tanks of the sludge-blanket type, followed by filtration through rapid filters which are not seriously clogged by this coagulant. Sterilization with chlorine follows, and the treated water contains only the merest trace of iron. The details of these experiments will prove useful in many tropical lands.

Luton has an urgent problem in sewage purification, for the growth of industry and population has outstripped the capacity of the purification plant, as is the case in so many towns to-day. The effluent passes to the River Lea not far from the headwaters, and the flow of the river has become depleted in recent years because of heavy pumping from the

chalk of the Chilterns. With the interaction of these events, the effluent from Luton forms too large a proportion of the flow below the town. This and other risks developing on the river and its tributaries below Luton throw weight on to the Metropolitan Water Board and tend to spoil what was not so long ago one of the loveliest rivers in England. The operation of filters and microstrainers designed to trap the humus from the final effluent is described in this report. Either device removes the humus to a high degree, but filtration seems to be rather more efficient in this regard and definitely more efficient in reducing the biochemical oxygen demand. As a filtering medium sand remains more stable in its grading than powdered anthracite, which tends to fragment in use.

A large part of the report is devoted to a description of the research carried out at the Board's Minworth (Birmingham) Laboratory. The well-known experiments with alternating double filtration of sewage, designed to prevent filter clogging where the sewage is very strong, have been extended, and various combinations of filtering methods are being tested in eight small-scale filters. Serial increase in dosing from the customary low rates up to 1,000 gallons per cubic yard per day are yielding information about the rapid rates of filtration that have become so much the vogue in the United States.

Anxiety about excess breeding of the sewage filter flies *Psychoda* and *Anisopus* has become negligible. It is shown that the addition of 'Gammexane' at the rate of 1 lb. per acre given in dispersible powder to the settled sewage is effective in reducing the emerging flies below annoyance-level. It is not necessary to stop the flow after the application, and this is a great advantage in fully loaded plants. The dose should be kept to the effective minimum, as the working of the larvæ is essential to keep the filters open and a residuum must be left for this purpose. The 'Gammexane' is largely adsorbed by filter film and humus, so that only a negligible amount reaches the river. The humus is frequently mixed with primary sludge and digested anaerobically, so the question has arisen whether the adsorbed 'Gammexane' would interfere with this process. No such harm can result, as only a relatively enormous dose will hamper digestion.

Other topics dealt with in this interesting report concern the stabilization of spent gas liquor by biological filtration, the effect of sewage works treatment on the numbers and types of bacteria, and the treatment of waste water discharged by a paper mill producing a special type of paper from rags and jute. A survey of the Thames Estuary to assess the effects of pollution has been started. The river water is saturated with dissolved oxygen at Teddington and supersaturated at Southend; but from Hammer-smith to Tilbury Landing Stage the oxygen value is exceedingly low, conditions indicate anaerobic processes, and gases such as methane and hydrogen sulphide tend to be evolved. Some details of the river bed are also given, and these show conditions better than might have been expected, for it is not until seaward of Barking that extensive deposits of black mud are found.

The Rivers Pollution Prevention Bill now under consideration provides that river boards should be able to prescribe standards with which effluents discharged to a stream, or in some cases to tidal waters, must comply. These standards are to vary with local circumstances, for in some cases a very high degree of purity will be required, while in others

* Department of Scientific and Industrial Research. Report of the Water Pollution Research Board, with the Report of the Director of Water Pollution Research, for the Year 1949. Pp. iv+48+4 pl. (London: H.M. Stationery Office, 1950.) 1s. 6d. net.

it is necessary only to remove the solids from the sewage. Intermediate standards will no doubt be expected in the most highly industrialized areas, for the rivers in such regions will always remain the drains of the economy. The costs of reducing the strongest sewages, such as flow from Bradford and Huddersfield, to the highest standard of purity would form far too heavy a charge on the local rates. Before such varied standards could be prescribed, tests would have to be devised for differing conditions. The Water Pollution Research Laboratory is represented on the committee that has been formed to advise on the formulation of these tests.

LL. LLOYD

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH OF NEW ZEALAND

ANNUAL REPORT

THE twenty-fourth annual report of the Department of Scientific and Industrial Research, Dominion of New Zealand*, includes the Minister's statement, the Secretary's report and the reports from the various branches, research committees, etc. The Secretary's report refers to the disappointing results which have so far attended efforts to improve the accommodation conditions. Inordinately high building-costs and the shortage of skilled labour have accentuated the difficulties, and the unsatisfactory conditions are markedly affecting the efficiency of certain branches, conditions being particularly bad in the Dominion Laboratory, Grasslands Division, Geological Survey, Soil Bureau and Botany Division. Recruitment of staff has accordingly been kept to a minimum, though attention has been given to the introduction of a scheme of assessing scientific ability and effectiveness and of relating this to promotion. No progress has been made with the establishment of an organization to deal with building and civil-engineering research; but a small Meat Research Section has been established in the Dominion Laboratory. The increased interest in research associations for the manufacturing industries has been a feature of the year.

The Agronomy Division has achieved notable successes with the introduction or breeding of disease-resistant varieties, including the following: rape resistant to club-root; *R₁* (Stakhanovetz) linen flax and Cheyenne linseed which are both resistant to the New Zealand strains of flax rust; Achilles oats, an Algerian type which is resistant to leaf-rust and stem-rust; and Calder swede, which is strongly resistant to aphid attack and to turnip-mosaic and moderately resistant to dry-rot, club-root and mottled heart. A survey of vegetable crops has shown that there is great variation of type within strains and varieties of commercial seed, especially among the brassicas, and that some considerable improvement can be effected by careful selection. The recently established chemical laboratory is evaluating different varieties of potatoes in respect of vitamin C and in measuring the extent to which different varieties retain the vitamin on prolonged storage. In the Animal Ecology Section the two major investigations are, first, a study of the biology

* New Zealand. Twenty-fourth Annual Report of the Department of Scientific and Industrial Research. Pp. 112. (Wellington: Government Printer, 1950.) 2s.

of the rabbit with the aim of providing basic information for improved control measures, and, secondly, a survey of the mammal and bird fauna of New Zealand.

The Auckland Industrial Development Laboratories were finally established during the year, and the newspaper-wrapping machine has attracted considerable interest. The Electrical Standardization Laboratory has now been established, and in the Engineering Design Section an experimental water-sampling device has been developed. The importance of the herbarium in the Botany Division is increasing, while the Plant Introduction Service has handled 249 out of 620 recorded introductions. Intensive investigations on yellow-leaf disease are continuing at the Moutoa Phormium Research Station. In the Dominion Laboratory the study of the New Zealand grown pines, *Pinus radiata*, *P. laricio* and *P. murrayana*, was continued, including the determination of the distribution of resinous extractives, and assistance was given in the smelting of Patea iron-sands at Onekake by the Department of Industries and Commerce. Work on the curing of tobacco leaf was continued, and analyses made of many samples of spraying-materials.

In the Dominion Physical Laboratory work was carried out on the thermal insulation of buildings, the efficiency of domestic open-hearth fires, the physical properties of *P. radiata*, solar and sky radiation at the surface of the earth, the electrical conductivities of New Zealand soils, and the vibrations of engineering structures. An experimental model of a new type of fractionating molecular still has been built, and apparatus is being developed for supplying plants with artificial sunlight when growing in enclosed cabinets. The amount of external servicing for industry considerably decreased; the investigation of anomalous propagation of radio-waves under north-west wind conditions in Canterbury was completed, and modifications made to the vehicle-speed indicator have increased its accuracy and operational range.

The Fats Research Laboratory, in collaboration with the Dairy Research Institute, has directed its main attention to the elucidation of the nature of butter-fat; but increasing emphasis is being placed on meat fats as part of the New Zealand contribution towards collaborative British Commonwealth work on meat. At the Fruit Research Station field trials are in progress to diagnose a number of fruit-tree diseases suspected of being due to mineral deficiencies, and attempts are being made to develop standard biological tests for the synthetic plant hormones used for setting tomato fruits and for preventing pre-harvest drop of apples. The Geological Survey has been fully taxed by increasing requests for information and guidance on the availability and development of raw materials required by industry, on problems of water-supply, and economic and engineering geology, in addition to the systematic regional mapping and investigation of New Zealand coalfields. Data from the Geophysical Observatory, Christchurch, have proved to be of special importance to international organizations in geophysics, while at the Geophysical Observatory, Wellington, a relation has been established between the 'age' of the moon and the variation of tidal phase differences between Island Bay and Makara.

The Grasslands Division has maintained and improved by further breeding the standard of the pedigree strains of pasture plants, and a study of the