SCIENTIFIC AND INDUSTRIAL RESEARCH IN AUSTRALIA

THE seventeenth annual report of the Council for Scientific and Industrial Research, Commonwealth of Australia*, covers the year ended June 30, 1943, in which the total expenditure of the Council was £541,283, of which £106,126 was contributed from sources other than the Commonwealth Treasury. A large part of the Council's activities is now devoted to the solution of problems arising out of the War and to assistance and advice to Government Departments and other institutions and organizations concerned with the war effort, particularly the work of the National Standards Laboratory and the Departments of Aeronautics, Forest Products and Industrial Chemistry. Reference to these activities in the report is either confined to brief general statements or entirely omitted.

The work of the Division of Plant Industry followed the lines of last year. The Division continued to prosecute investigations leading to the production of essential drug plants, including those on poppy, pyrethrum, cinchona, *Duboisia* and *Ephedra*. In this work the Medical Equipment Control Committee of the National Health and Medical Research Council, the Department of Pharmacy, University of Sydney, the Physiology Department of the University of Melbourne, and the Forestry Department of Queensland are co-operating. Special attention is being paid to studies of plants likely to serve as a source of rubber, particularly to guayule and *Taraxacum koksaghyz*. Work is being continued on microbiological retting of flax, with some interesting results which may have an important bearing on the process. In spite of great difficulties owing to the shortage of seed and increased requirements, the Commonwealth Vegetable Seeds Committee set up in January 1942 operated under the chairmanship of the chief of the Division until January 1943, and the foundations have been laid for the development of a permanent industry.

Entomological investigations carried out for the medical branches of the Fighting Services have been very fruitful. Valuable practical results have come from the studies of the insect pests of stored wheat and wool. The work on insect pests of stored wheat has covered control measures in bulk depots, the fumigation of bag-sacks and the sterilization of stack sites. In testing some Australian nitrated cresols, it was found that mineral oil emulsion containing 5 per cent commercial grade dinitro-*o*-cresol was comparable in toxicity with the proprietary emulsion. Fumigation experiments have been carried on with the view of selecting material for use as sprays or solid fumigants against infested stacks of stored wool, and a nozzle has been designed which enables satisfactory distribution of liquid sprays to be obtained within a wool stack when used in conjunction with a jetting plant, and a technique for spraying stacks from above has been devised. The potato moth caused severe crop losses on the mainland during 1942–43, and experiments were carried out with a number of materials used as sprays for the control of potato larvæ in the haulms in the field, basic copper arsenate giving the most promising results.

In the field of animal health and nutrition more attention has been given to the immediate needs of the animal industry and to the application of existing knowledge to prevent waste. Investigations at the Animal Health Research Laboratory, Melbourne, have covered pleuropneumonia of cattle, mastitis in dairy cattle, contagious abortion, a study of the mechanics of hand-feeding sheep, and the toxicity of wheat for stock. The McMaster Animal Health Laboratory has continued its studies of phenothiazine in the control of nodulle worm, and of the large stomach worm in sheep, as well as its work on dips and dipping. The study of the physical properties of wool has been interrupted, but in the field of wool biology further advance has been made towards establishing a method of analysis by which the main sources of biological variation within and between fleeces can be studied under well-controlled and uniform conditions. The Animal Nutrition Laboratory, Adelaide, has brought its investigations on energy metabolism of sheep to a stage ready for preparation for publication as a scientific monograph.

The work of the Division of Soils in the first half-year was largely concentrated on defence projects, and field surveys of laboratory research have been restricted through lack of staff. The main change has been the initiation of a programme of investigations in soil mechanics, principally concerning soil-cement, which it is proposed to continue as a major project. Investigations on the stabilization of soils with pure calcium chloride showed that dressings up to 6 lb. pure calcium chloride per square yard were insufficient to stabilize soils in inland southern Australia under concentrated traffic. The Commonwealth Research Station at Merbein, Victoria, was established primarily to investigate problems associated with the production and processing of dried fruit, including irrigation of the land and maintenance of soil fertility. Some of the investigations have been suspended during the last two years and replaced by investigations dealing with special war-time requirements, but the experience of the Station in primary production under irrigation conditions and in drying foodstuffs is being fully utilized by the Commonwealth Department dealing with the processing and storing of dried fruits and vegetables, and in the production of special crops not previously grown in commercial quantities in Australia. Fruit-drying investigations have now been extended to practically all dried fruits required by the supply authorities. The Station has assisted in the development of about 500 acres of land brought under irrigation since the outbreak of war. The plants grown include vegetables at military establishments, grass covers for aerodromes and drug plants. The Irrigation Research Station at Griffith, New South Wales, established in 1924, has been considerably expanded owing to pressing problems in maintaining the production of fruit and increasing that of vegetables. The long-term citrus cover-crop plants at the Station have demonstrated the value of lucerne in controlling excess soil moisture, salt and structure deterioration. Vegetable investigations have been concerned mainly with irrigation, the germination of seed, particularly of carrots, and weed control. The Station has also assisted in defining soil and slope suitability standards as a guide to the use of land for citrus.

The main activity of the Division of Forest Products has continued to be advisory work for the various branches of the Services and industry. Steady progress has been made in investigations basic to aircraft production, such as the development of improved wood and the use of timbers for aircraft plywood other than those already approved. Problems

* Seventeenth Annual Report of the Council for Scientific and Industrial Research, for the Year ended 30th June 1943. Pp. 76. (Canberra: Commonwealth Government Printer, 1944.) 3*s*. 4*d*.

arising out of the treatment of timber to fit it for use in tropical areas are under investigation. New laboratories have been erected for paper-testing work and for flax, but much experimental work is awaiting development in connexion with the newer types of synthetic resin glues and methods of plywood manufacture and use.

The work of the Division of Food Preservation and Transport has also been almost entirely devoted to problems of direct importance in the war effort. The canning and dehydration of foodstuffs continue to be the most important fields of investigation for the Division. The Meat Investigation Laboratory at Brisbane has been concerned chiefly with dehydrated beef, and the investigations have led to a closer definition of ideal processing conditions and may reduce processing costs. Particular attention has been given to the improvement of flavour. In work on storage it was observed that the dried meat is very subject to infestation by a beetle, *Dermestes vulpinus*. Other investigations have covered a survey of the vitamin C content of tomato varieties grown in the Bathurst district and of the vitamin C content during the processing of canned tomatoes, tomato juice and tomato puree. Meat-canning investigations have also assisted with production programmes, and container investigations have led to the development of technique and equipment for the rapid testing of cans. An attempt has been made to obtain fundamental data in this field, including studies of the effect of variations in tinplate thickness on closing-machine adjustments. Experiments to determine the storage life of different samples of dried egg under various conditions have continued, but the storage experiments on dried mutton have been completed. The Microbiological Section has been concerned almost entirely with canned foods and investigations on eggs. Fruit-storage investigations have included skin coatings on apples; the best results were obtained by hand dipping the apples in an alcoholic solution of 8 per cent castor oil and 2 per cent of de-waxed shellac. The treated fruit was less wilted, firmer, crisper and more juicy and the flavour and acid were retained longer. Wax emulsions are more effective than oil emulsions in retarding loss of moisture, but require higher concentrations and more alkaline soaps. The Fruit Products Section has been largely responsible for organizing the large-scale production in several States of canned and bottled citrus juices for antiscorbutic purposes in Service rations. The production of canned apple juice fortified with synthetic vitamins was also commenced in New South Wales and Tasmania, and research has been carried out on substitute containers, the smoke curing of fish, and electrical moisture meters.

The Fisheries Investigations Division carried out a comprehensive survey of the fishing industry for the man-power authorities, and technical work connected with the manufacture of agar was done in conjunction with various firms interested. An extensive survey of seaweeds suitable for this purpose is at present being carried out by the Division. A pilot plant for the manufacture of sodium alginate, potash and iodine is working in Sydney. Livers of twenty species of shark and ray have been examined for oil and vitamin content in an effort to find livers rich in vitamin A and possibly vitamin D to augment supplies being used in Victoria. The withdrawal of the research vessel *Warreen* from service during the year broke the continuity of the tuna observations on the south-east coast.

In the Industrial Chemistry Division, the Biochemistry Section continued research designed to assist the fellmongering industry, while the Minerals Section assisted in the commercial utilization of Australian minerals by devising and adopting chemical treatments necessary for the manufacture of a wide range of chemical compounds from crude ores and minerals; chromite, monazite, fluorite, bauxite, graphite, pyrolusite, rutile, beryl and rock phosphate received the main attention during the year. The whole of the research work in physical metallurgy of the Divisions of Industrial Chemistry and Aeronautics has now been consolidated in one Section of Physical Metallurgy, included for administrative purposes within the Division of Industrial Chemistry.

The Organic Chemistry Section has constructed and operated a pilot plant for the manufacture of ethylene. A pilot plant is also being constructed for the manufacture of ethylenechlorohydrin by a continuous process. Preliminary preparations of a synthetic rubber of the 'Thioplast' type have been made, and phenol and cresol-formaldehyde resins have been investigated to discover resins suitable for the production of compregnated woods and as hot glues for plywoods, compregnated woods, and wood-metal joints. A method of analysis developed in the laboratory gives valuable information when applied to resins of outside origin. Resins of the aniline/formaldehyde type are also being developed as moulding powders for some electrical work and as adhesives for compregnated woods. Surplus fatty acids have been examined as possible sources of substitute waxes, and a method of estimating the mannitol in the exudation from trees, *Myoporum platycarpum*, has been completed, and the isolation of the material on a pilot-plant scale is under investigation. The section concerned with lubricants and bearings have been engaged primarily on confidential war work.

The Information Section has made a distinct contribution to the war effort in the preparation of summaries and bibliographies connected with aspects of technical productions, and in the compilation of information on the substitution of Australian raw materials for materials formerly imported. Officers of the Section have continued to act as an abstracting panel for the preparation of *Australian Chemical Abstracts*, published by the Australian Chemical Institute, which are confined entirely to reports and articles published in Australia, and to Australian patents.

PENICILLIN TREATMENT OF VENEREAL DISEASE AND SPIROCHÆTAL INFECTIONS

THE remarkably successful treatment of gonorrhœa with penicillin was recorded in an earlier note on penicillin treatment (*Nature*, 677, Nov. 25, 1944). In that note also the opinion of United States Army medical men that the immediate effects of penicillin in the treatment of syphilis are better than those of arsenical preparations was recorded. Leading articles in the *Lancet* (853, Dec. 30, 1944) and the *British Medical Journal* (821, Dec. 23, 1944) discuss the whole question of penicillin treatment of human syphilis, with references to the relevant literature.

In the United States the first experiments on this problem were done on rabbits infected with syphilis, and J. F. Mahoney, R. C. Arnold and A. Harris