

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 compressed woods and as hot glues for plywoods, compressed 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 compressed 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

(*Ven. Dis. Inform.*, 24, 355; 1943) were apparently the first to record penicillin treatment of human syphilis. In Britain, E. M. Lourie and H. O. J. Collier (*Ann. Trop. Med. and Parasitol.*, 37, 200; 1943) showed that penicillin will cure infections of mice with *Treponema recurrentis* and *Spirillum minus*. In co-operation with A. O. F. Ross and R. B. Wilson (*Lancet*, 845, Dec. 30, 1944) they report on the treatment of five cases of human syphilis with penicillin. All these cases had well-marked secondary lesions, and the immediate response "could not have been bettered by any known form of treatment". The spirochaetes and lesions disappeared at least as rapidly as they do under treatment with arsenicals and bismuth. But all these cases were in the secondary stage of the disease, and later observations upon them showed that only one of the five cases was apparently cured. It was therefore doubtful whether penicillin was as beneficial as arsenicals and bismuth would have been. These authors concluded that penicillin will not become suitable for routine civilian practice until frequently repeated day- and night-injections can be avoided.

The problem of dosage in the treatment of syphilis is discussed by both the *British Medical Journal* and the *Lancet* (*loc. cit.*). In the United States, where so much more penicillin is available, extensive trials of it for the treatment of syphilis have been going on at thirty-one centres, and the *Lancet* discusses the reports on these and the supply of penicillin, stating that, by April 1944, the tentative production programme of the United States and Canada was, according to R. D. Coghill (*Chem. Engineer. News*, 22, 588; 1944), of the order of 200,000 mega units (1 mega unit is 1 million Oxford units). There will be general agreement that we are justified in expending a large proportion of even the limited British supplies of penicillin on the study of its effects on syphilis. Arsenical treatment is more toxic and is not infallible; it involves supervision of the patient for a year or longer, and J. Marshall (*Nature*, 153, 187; 1944) has pointed out that less than half the patients get enough of such treatment to ensure a cure-rate of 80 per cent, because they default. One danger of future penicillin treatment is emphasized by both the *Lancet* and the *British Medical Journal* (*loc. cit.*). A patient may have both gonorrhoea and syphilis at the same time. The gonococcus is more susceptible to penicillin than the spirochaete of syphilis. Treatment with doses of penicillin which are sufficient to cure the gonorrhoea may therefore suppress the early signs of the syphilis, without being sufficient to cure this disease, especially if the syphilis is at an early stage when the only sign of it may be a hidden chancre. The diagnosis of syphilis may therefore be only made later when the secondary signs appear. F. L. Lydon and W. R. S. Cowe (*Brit. Med. J.*, 110, Jan. 27, 1945) also discuss this subject, adding the point that battle casualties treated with penicillin for gonorrhoea, for which it is, they agree, the drug of choice, may be incubating syphilis as well, which would thus escape detection. They think that routine blood-tests should be enforced by law upon the whole population. Similar cases of coincident infections with these two venereal diseases are discussed by F. A. Ellis (*J. Amer. Med. Assoc.*, 126, 80; 1944) and by C. R. Wise and D. M. Spillsbury (*Brit. J. Surg.*, 32, 214; 1944).

Penicillin seems to be very effective also against other spirochaetes and their relatives. Brigadier G. M. Findlay, Major K. R. Hill and A. Macpherson (*Nature*,

795, Dec. 23, 1944) report some success in the treatment with penicillin of yaws, due to *Spirochaeta pertenuis* and of tropical ulcers infected with spirochaetes, fusiform bacilli and other organisms. Ulcers have caused, during 1944, the loss of 30,000 men-days among West African troops. A. B. MacGregor and D. A. Long (*Brit. Med. J.*, 686, Nov. 25, 1944) report the rapid disappearance of *Treponema vincenti*, the cause of Vincent's gingivitis, under treatment with penicillin incorporated in pastilles. J. M. Alston and J. C. Broom (*Brit. Med. J.*, 718, Dec. 2, 1944) report on their experiments on its action on nine strains of *Leptospira icterohaemorrhagiae*, the cause of Weil's disease (six strains were human, two were from rats and one from a dog) and on one strain of *L. canicola*, the cause of another form of leptospiral infection of man and dogs. Penicillin killed all these strains in cultures and also inhibited their multiplication. It also cured infections of guinea pigs with leptospira virulent to them, provided that it was given early enough (eighteen hours after infection). It did not prevent the development in the guinea pigs of serum antibodies or resistance to re-infection. It was not toxic to the guinea pigs as others have reported it to be. In the same issue of the *British Medical Journal* (p. 720), V. Lloyd Hart reports upon the treatment of one Italian male suffering from Weil's disease. The results suggest that even the very small doses, given at relatively long intervals, had some curative effect; but Hart also emphasizes the need for early administration. It is, however, difficult to diagnose Weil's disease in its early stages. The same necessity for early administration is emphasized by Brig. E. Bulmer (*Brit. Med. J.*, 113, Jan. 27, 1945) in his summary of the treatment by various medical officers of sixteen cases of the same disease in Normandy. It is thought that Weil's disease is spread by infected rats, which pass the spirochaetes in their urine. The spirochaetes can live for a time in stagnant water, wells and sewers, so that men infect themselves by drinking and bathing. Up to December 1944, cases had been notified between mid-July and the end of September, and only from Normandy. It is, Bulmer thinks, surprising that cases have not occurred in the Low Countries, where there is "plenty of water". There was great difficulty in assessing the results of the penicillin treatment. The liver and kidneys are rapidly damaged by the spirochaete, so that penicillin should ideally be given before the diagnosis can be made. Inadequate doses of penicillin appeared, however, to shorten the duration of the fever and to cause dramatic improvement, especially when high doses were given. It did not appear to influence the damage done to the liver and kidney. In the same issue of the *British Medical Journal* (p. 119), A. E. Carragher reports on the treatment of one other case, a soldier invalided from France. After only six injections of penicillin the *Leptospira* disappeared from the blood and there was rapid clinical improvement.

Among other organisms of the spirochaete type are *Streptobacillus moniliformis* and *Spirillum minus*, the causative organisms of the two rat-bite fevers. The reasons for the conclusions that two organisms are concerned in the etiology of this disease have been discussed (*Lancet*, 540, Oct. 21, 1944), together with the effect of penicillin on them. F. R. Heilman and W. E. Herrell (*Proc. Staff Meeting, Mayo Clinic*, 19, 257; 1944) and H. Eagle and H. J. Magnuson (*Pub. Health Rep. Wash.*, 59, 583; 1944) have confirmed the results obtained by Lourie and Collier mentioned

above. Heilman and Herrell found that penicillin cured mouse infections with *Sp. minus* and *Strept. moniliformis*, so that both forms of rat-bite fever may prove susceptible to it. The former responds dramatically to organic arsenicals, but the latter resists arsenic, sulphonamides and gold treatment. F. F. Kane (*Lancet*, 548, Oct. 21, 1944) reports on the infection of an Ulster boy with *Strept. moniliformis* as the result of a rat-bite, which was successfully treated with penicillin after gold treatment had failed. Eagle and Magnuson obtained cures with penicillin of infections of rats and mice with *Spirochaeta recurrentis* (= *Treponema novyi*), so that it is possible that penicillin may prove better than arsenic for the treatment of relapsing fever of man, which is caused by this organism. G. LAPAGE.

FORESTRY AND THE PUBLIC WELFARE

AT the autumn general meeting of the American Philosophical Society held in the hall of the Society on November 17-18, 1944, the first day was devoted to a symposium on "Forestry and the Public Welfare", brief papers being read (among others) on forests in relation to soils and water (Raphael Zon); world-wide needs of woods (W. C. Lowdermilk), public control of cutting practices on private timberland (Joseph F. Kaylor), and forest conservation—public and private co-operation (Wilson Compton).

Zon's research work in connexion with forests, soils and water is well known. He gave a brief summary of important points. The longer precipitation remains in circulation over the land before, as run-off, it reaches streams and ocean, the greater its use to the land. The greatest effect of forests upon water is therefore that they tend to prolong this water-cycle on and in the soil. In deep soils a large reservoir of ground water is retained which only gradually but regularly feeds the streams, thus preventing exceptional high rises resulting in floods, or low levels which diminish agricultural supplies. The protective cover of the forest reduces wind damage, decreases evaporation from the soil, reduces the temperature of the air and soil within the forest during the summer and raises it in winter. Growing trees transpire and thus increase the humidity of the air over forests, while their roots stabilize the soil.

Lowdermilk, in discussing the world-wide needs of woods, pointed out that man has grown up with wood, that he has always utilized the substance in the past, and human progress, in spite of the many substitutes, demands ever larger amounts. Wood, he said, is "a natural wonder of chemistry and physical structure"; but cellular structure and chemical content of cell cavities give rise to a wide variety and many properties that serve hundreds of uses, even to paper and clothing fabrics. Modern technology has by special treatment of impregnation and compression produced new materials from wood that compete with metals. Chemical industries are opening up amazing possibilities in deriving from wood as raw material new chemicals based on fermentation of carbohydrates, even to the making of alcohol for rubber manufacture. On the subjects of demand, Lowdermilk said that the production of wood, reported as some 1.2 billion tons, is second only to that of fossil carbonized wood as coal, namely, 1.3 billion tons, and is practically tenfold that of steel.

America has long halted at the cross-roads of State interference in any way with the operations of the lumberman; enormous areas have been felled without a thought to the future, while fire has destroyed additional large areas of virgin forest. In his paper on public control of private felling, Kaylor said that within the last few years sentiment in many parts of the United States has veered strongly towards some form of public control of private fellings, the cumulative results of the unrestricted cuttings of the past now being more fully realized. A difference of opinion exists as to whether such control should be exercised by the individual States or by the Federal Government. Kaylor spoke for Maryland, stating that in 1943 the legislature of the State passed the Forest Conservancy Districts Act authorizing a Commission of State Forests and Parks to draw up rules of forest practice for all the privately owned forests of the State—certainly a move in the right direction.

Dealing with public and private co-operation in forest conservation, Wilson Compton discussed briefly the exploitation of the forests in the past and the results of surveys of the forests still existing in parts of the United States and the work of conservation now being carried out. The surveys showed that there are nearly a thousand tree farms comprising 10 million acres in the western and southern States, and the number is being constantly added to. In 1941 the National Lumber Manufacturers' Association co-operated with the forestry departments of thirty-seven States in a survey of 153 million acres of privately owned timber lands—the so-called industrial forest lands; of these, 25 million acres were under working plans, 45 million under less intensive management, another 73 million acres with reasonably satisfactory reproduction, but not adequately protected from fire. In other words, about 94 per cent of the area surveyed was considered to be in a "reasonably productive condition". When the total disregard shown for the immense forest estate exploited by the United States for so long, as if it were inexhaustible, is remembered, it is a good augury that the lumber companies, and to some extent the private forest owner, should have realized where unchecked exploitation was leading the country and its important industries.

FORTHCOMING EVENTS

(Meeting marked with an asterisk * is open to the public)

Monday, April 16

ROYAL SOCIETY OF ARTS (at John Adam Street, Adelphi, London, W.C.2), at 1.45 p.m.—Sir Frank Smith, G.C.B., G.B.E., F.R.S.: "Chemicals from Petroleum" (Cantor Lectures, 1).

FARMERS' CLUB (at the Royal Empire Society, Craven Street, Strand, W.C.2), at 2.30 p.m.—Mr. H. W. Grimmit: "Present and Future Aspects of Electricity in Agriculture".*

ASSOCIATION OF AUSTRIAN ENGINEERS, CHEMISTS AND SCIENTIFIC WORKERS IN GREAT BRITAIN (CHEMICAL GROUP) (at the Austrian Centre, 69 Eton Avenue, Hampstead, London, N.W.3), at 7.30 p.m.—Mr. E. Chilton: "Present-day Problems of Industrial Photography".

ROYAL GEOGRAPHICAL SOCIETY (at Kensington Gore, South Kensington, London, S.W.7), at 8 p.m.—Dr. H. L. Richardson: "Szechwan during the War".

Tuesday, April 17

INSTITUTION OF NAVAL ARCHITECTS (at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1), at 10.30 a.m.—Admiral of the Fleet the Rt. Hon. Lord Chatfield, G.C.B., O.M.: Presidential Address; Sir Amos L. Ayre, K.B.E.: "Merchant Shipbuilding during the War". At 4.30 p.m.—Mr. E. H. Watts: "Crews' Accommodation in Tramp Ships"; Mr. A. J. Sims: "The Habitability of Naval Ships under Wartime Conditions".

ROYAL SOCIETY OF ARTS (DOMINIONS AND COLONIES SECTION) (at John Adam Street, Adelphi, London, W.C.2), at 1.45 p.m.—Dr. Charles Camsell: "The New Programme of Field Investigation in the Canadian North-West".