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EDITORIAL.

The British White Paper on "The Scientific Civil Service" outlines a scheme containing most of the features a reasonable scientific worker will consider desirable. "Better conditions of service" are realised to include conditions under which experimental research will be facilitated and stimulated, relaxation of restrictions on publication, encouragement of interchange of ideas with investigators outside the Service, a common superannuation scheme with universities to assist exchange of staff and a new salary scale. The latter is designed to increase the number of senior positions, and the rate at which outstanding scientists can reach them, and special provision is to be made for recruiting graduates with research qualifications at above the normal minimum salary, and even to grades above the basic if they possess exceptional qualifications and experience. The new Service is regarded as sufficiently important during the reconstruction period for a special part-time commissioner to be added to the Civil Service special part-time Commissioner to be added to the Civil Service Commission to deal with recruitment of scientific officers.

The recent Honours lists do not indicate an unusually high regard among our political leaders for the part played by New Zealand scientists in the war. Nor does the delay in announcing better conditions for the rank and file in our "scientific civil service," suggest that the New Zealand Government is, like the British Government, "deeply conscious of the contribution made by science towards the winning of the war, a contribution which may have altered the whole course of the war and has certainly shortened its duration." These failures may however be forgiven if the delay is only a delay, and a scheme is soon to be announced which will show that the Government is, "conscious of the contribution which science can make during peace to the efficiency of production, to higher standards of living, to improved health and to the means of defence," and is likewise resolved "that the conditions of service for scientists working for the Government shall be such as to attract into the Civil Service scientifically qualified men and women of high calibre and to enable them after entry to make the best use of their abilities. . . . . "

CONFERENCE 1946.

Conference 1946 will be held towards the end of August (tentative dates, August 27-29 depending on where Conference is held).

Accomodation is difficult to arrange and the Committee cannot yet announce the site.

The programme will be arranged under four main headings as follows:—

1. Industrial.
2. Analytical (including apparatus, technique and micro-analysis).
3. University.
4. Agricultural and Biochemical.

Members are asked to contribute papers under the above headings and should send a title and brief precis of the proposed paper to the Conference Secretary, P.O. Box 250, Wellington, C.1. not later than April 30th.

A programme will then be drawn up and the selected papers will be required in full by July 31st for cyclostyling prior to Conference.

Individual contributions should be limited to about 15-20 minutes (approx 2,000 words).

Report of the Meeting of the Council of the New Zealand Institute of Chemistry

held in the Council Room, D.S.I.R., Wellington on Wednesday, November 28th, 1945, at 1.30 p.m. and, after an adjournment, on Monday, December 3rd, 1945, at 4 p.m.

Present:—Professor F. G. Soper, Vice-President (in the Chair); Mr. G. Chamberlain, Auckland proxy; Mr. J. L. Mandeno, Wellington proxy; Mr. F. H. G. Johnstone, Canterbury delegate; Mr. L. H. James, Otago proxy; Mr. L. Wilkinson, Assistant Secretary; Mr. W. G. Hughson, Hon. General Secretary-Treasurer; Dr. J. K. Dixon, Canterbury proxy was present by invitation.

3/12/45. Dr. J. K. Dixon (elected to the Chair), Mr. Chamberlain, Mr. Mandeno, Mr. James, Mr. Wilkinson and Mr. Hughson.

Income Tax Commissioner:—Dr. Dixon and the Hon. Gen. Secretary submitted a report summarising their interview with the Income Tax Commissioner. Copies of the report were distri-

buted at the meeting and will be sent to Branch secretaries. With certain reservations, the Commissioner viewed favourably the institution of Company subscriptions provided the money was used for specific purposes. A written statement must be prepared and submitted to him before any definite decision can be given.

Registrar to the Institute:—Discussion centred around the Hon. Gen. Secretary's preliminary negotiations regarding the services of a suitable man for a Registrar. The Secretary mentioned that the gentleman with whom he had been negotiating had now stated that he would accept £150 per annum to take over all the secretarial duties with the exception of cyclostyling. Although this seems high as an initial charge, it was indicated that the fee would not be increased even though the business of the Institute expanded very considerably. It was decided to pursue the negotiations further with a view to the delineation of duties and refer the results of his negotations to the branches for comment.

In the meantime the Hon. Gen. Secretary is authorised to engage the services of a suitable person to assist with some of the secretarial work and that he be given authority to fix payment at about 10s. per week.

Increase in Subscriptions:—Auckland, Wellington and Canterbury were in favour of an increase in annual subscriptions but Otago had had insufficient time and information to consider the matter fully and desired that the matter be referred again to the branches. After some discussion, during which the need to make a decision was stressed, it was decided that the subscriptions for Associates and Fellows be increased from £1.1.0 to £1.11.6 for Associates, and to £2.2.0 for Fellows.

The Secretary was instructed to inform the branch secretaries immediately of the rise in subscriptions and also to give Otago full information regarding the necessity for increased subscriptions and the need for an early decision.

Entrance Fees:—Auckland was the only branch in favour of the suggestion that entrance fees should be charged. No action will be taken.

Chemists and Pharmacists:—Mr. Hughson reported briefly on discussions with the Public Service Commissioner re the use of the terms "Chemist" and "Pharmacist." The Minister of Health, in connection with Social Security, agreed to use the term "Pharmacist" and "Pharmaceutical", and it is understood from a member of the Pharmacy Board that the Board is generally in favour of the term "Pharmacist" rather than "Chemist."

The Hon. Gen. Secretary was instructed to write to the

Pharmacy Board officially and obtain an opinion on the matter.

Institute Charter:—It was decided to investigate the procedure and cost of obtaining a charter and report back to an early meeting of Council.

Association of Scientific Workers:—It was agreed that the N.Z. Institute of Chemistry be associated with the Association of Scientific Workers in their approach to the Income Tax Commissioner with requests for certain exemptions from income tax.

Federation of Professional Workers:—Council appointed two delegates to attend the inaugural meeting of the proposed Federation of Professional Workers as observers.

Messrs. Chamberlain and Wilkinson attended and Mr. Wilkinson reports that the representatives of the other organisations present—Pharmacy Board, Institute of Architects, Institute of Surveyors, Institute of Forestry, Institute of Veterinarians and the Professional Engineers' Association—were there as observers only. Copies of the minutes will be sent to Branch secretaries.

Colonel Glasgow:—It was recorded that the Hon. Secretary had sent the congratulations of the Institute to Colonel K. W. R. Glasgow on the award of the D.S.O.

Election of Officers:—Dr. J. C. Andrews was re-elected President and Dr. F. G. Soper, Vice-President.

Messrs. W. G. Hughson and L. Wilkinson were re-elected as Secretary-Treasurer and Assistant Secretary respectively.

Dr. H. N. Parton was re-appointed Editor of the Journal.

Dr. R. Gardner and Mr. W. A. Joiner were elected to the Membership Committee.

The Medical Advertisements Committee consists of Mr. L. H. James (Convener and Secretary), and Messrs. G. Chamberlain and J. N. Sutherland.

Messrs. M. L. Stewart and G. S. Lambert were re-elected as representative and deputy respectively on the Chemical Committee of the Standards Institute.

The Salary Committee appointed in February 1945, was disbanded, and Dr. J. K. Dixon retained to represent the Institute on any such committee which may be formed.

The President, Dr. Dixon and the Hon. Secretary, together with Messrs. Joiner and Lawrence (Royal Institute of Chemistry), comprise the 1946 Conference Committee.

The President and Mr. J. L. Mandeno, with Dr. Dixon and Mr. A. D. Munro (R.I.C.) form the Chemists' Employment Committee.

ELECTION OF FELLOW.

Dr. F. H. McDowall, Director of the Dairy Research Institute, Palmerston North has been elected a Fellow. After a short period lecturing in Chemistry at University College, London, Dr. McDowall came to New Zealand and has been chief chemist at the Dairy Research Institute since 1928.

ELECTION OF ASSOCIATES.

Council has much pleasure in extending a welcome to the following new members who have been elected Associates of the Institute.

Auckland:—J. C. Dacre who graduated B.Sc. in Auckland in 1943, is Technical Officer with the State Forest Survey.

Miss. A. W. N. Tuck graduated M.Sc. at Otago University 1941, and is now with the Dept. of Agriculture, Ruakura.

M. R. Coup, B.Sc. Victoria College,1937, is also at Ruakura with the Dept. of Agriculture.

D. L. Stacey, B.Sc., Auckland 1942, is Assistant Chemist, N.Z. Forest Products Ltd., Auckland.

H. B. Oakley, B.Sc. Hons., London 1938, is Chief Chemist to the Internal Marketing Division, Pukekohe.

W. Sprott who took his M.Sc. degree in 1943, is Shift Chemist to the Internal Marketing Division, Pukekohe.

Wellington:—D. G. Coster, M.Sc., Otago, 1943, is an industrial chemist with the Vacuum Oil Co., Wellington.

N. D. Jamieson M.Sc., Victoria College, 1940 is on biochemical work at the Animal Research Station, Wallaceville.

I. C. McDowall M.Sc., Victoria College, 1943 is an Assistant Chemist at the Dominion Laboratory, Wellington.

R. N. Seelye M.Sc., Victoria College, 1942 is an Assistant Chemist, Dominion Laboratory, Wellington.

L. W. Tiller who took his B.Sc. at Victoria is Fruit Research Officer with the Dept. of Scientific and Industrial Research.

H. M. Williamson B.Sc. Victoria College, 1941, after two years with Radio Developement is now back at the Dominion Laboratory working on bitumen and highway materials.

A. C. Harris well known in Canterbury where he took his M.Sc. degree in 1933, was for some years in Australia before taking up his present post of Technical Manager, I.C.I. (N.Z.) Ltd., in Wellington.

Canterbury:—Miss J. B. Ross took her M.Sc. degree in Chemistry at Canterbury College and is now Industrial Chemist with the Davis Gelatine Co., Woolston.

Dr. P. R. McMahon, Wool Metrologist at Lincoln Agricultural College, took his Ph.D. in textile chemistry at Leeds. He is also a member of the Royal Institute of Chemistry.

J. F. Moffat and A. F. Johnson both graduates of Canterbury College are teaching science at the Boys High School, Riccarton. They were members in the early days of the Institute and were recently re-elected. Lieut.-Colonel Moffat commanded the 35th Battalion, 13th Division, at the landings on Mono and Vella Lavella.

Otago:—Miss Monica Lindsay M.Sc., Otago, 1943, after a short period with the Dept. of Agriculture, Ruakura, has taken a position at the Medical School, Dunedin.

RESIGNATION.

At last meeting of Committee the resignation of Mr. T. H. Northy, of the Canterbury Branch, was accepted with regret.

REMOVED FROM REGISTER.

Council desires to intimate officially that the name of Mr. F. G. Westbrook of the Wellington Branch has been removed from the Register and his Certificate of Membership is cancelled.

INSTITUTE ESSAY PRIZE

Entries for the Essay Prize must be in the hands of the Hon. General Secretary not later than June 30th. Detailed regulations may be obtained from the Hon. Secretary, or from Local Secretaries.

NOTES ON EMPLOYMENT REGISTER.

Institute members are reminded that the Chemists' Employment Register has been established to serve their interests. On payment of a registration fee of 10/- per annum to cover cyclostyling, stamps and similar expenses, members are entitled

to receive circulars setting out details of positions vacant for chemists in New Zealand and Australia.

These circulars are issued frequently, usually at fortnightly intervals and include a wide range of positions in which chemical qualifications are required or an advantage. Some positions which are circularised are not advertised in the daily press.

In order to secure success in maintenance of the register, the circulars are confidential to registered members. Anyone wishing to apply for registration should forward the necessary completed registration form together with 10/-. In the case of unemployed chemists, the fee for registration is waived until such time as employment is found when the fee for the current year becomes due. Registration forms may be obtained from the Hon. Secretary, Chemists' Employment Committee P.O. Box 250, Wellington or from the local representative as follows:—

Auckland—Dr. J. C. Andrews, 63 Onslow Ave., Auckland. Mr. K. M. Griffin, Dominion Laboratory, 1ZB Building.

Wellington—Mr. D. H. Freeman, 30A Grass St., Wellington

Canterbury—Mr. F. H. G. Johnstone, P.O. Box 325, Ch.ch.

Otago—Mr. H. G. Woolman, Reckitts and Colman (N.Z.) Ltd., Forth Street, Dunedin.

Details of the following types of positions have appeared in circulars sent out since the New Year:—

Analytical (2), research (3), food technology (2), metallurgical (1), educational (1), demonstrator (1), lectureships (1), science teaching (1), paint chemist (1), organic (1) and administrative (1).

THE FIFTEENTH ANNUAL REPORT.

The Annual Report for 1945 reveals the steady increase in membership of the Institute, from 222 in 1943 to 279 in 1945. Auckland Branch increased by 50 per cent in this period, while the North Island membership is more than twice that of the South (or Main) Island.

Five Fellows and 37 Associates were elected during the year.

The Trust Fund now stands at £153.11.1 The President, Sir Theodore Rigg and Mr. G. A. Lawrence are Trustees.

The Branch Editors, Messrs. S. G. Brooker, E. S. Borthwick and P. A. Ongley, contributed largely to the work of producing the Journal.

Advertising Rates are as follows:—

Full Page.	£3	10	0	per page per issue.
	£12	0	0	per page per year.
Half Page.	£2	0	0	per issue.
	£7	0	0	per year.
Small.		10	0	per inch per issue.

Forty chemists have been placed on the Employment Register, and 10 circulars were sent out between July and October 1945. Thirty-one applications and enquiries were received from overseas, mainly from England.

BRANCH NOTES

AUCKLAND BRANCH.

At the meeting held on October 4th, Prof. Worley took the chair and Mr. K. M. Griffin, M.Sc., F.R.I.C., gave his Chairman's address on Sewage Disposal. Mr. Griffin said the subject might be better described as sewage treatment or sewage utilisation. The oldest method used was the sewage farm, first developed in Germany in the XVIth century. For success the rainfall should be less than 20 inches per annum, so that in many places, e.g. Paris the farm can only be used in summer. About one acre is required per ten persons. It does not effect a complete disposal of the material. Certain diseases have been found in cattle grazed on land irrigated with sewage.

The second method of disposal was by dilution, i.e. passing into, a large body of water. The material was then digested by plankton, which in turn was the principal food of fish. In Chicago an elaborate scheme was established in 1900 involving taking water from Lake Michigan for diluting the sewage which was then passed into the Mississippi system of rivers. As the sewage per person in Chicago is very high, the level of the Great Lakes was found to be reduced and the scheme had to be abandoned.

The third method was the septic tank which involved sedimentation and digestion in the same tank. On a large scale this means a big problem in disposal of the foul sludge. In the Imphoff system, digestion and sedimentation are separated by a grating, and lime is added to keep the system alkaline.

It can readily be desludged and is in use at military camps and mental hospitals in New Zealand, and at Westside, Chicago, handling 472 million gallons per day. Another system has separated digestion and sedimentation and the gas produced can be used to run engines as is done at Birmingham and other places. Chemical precipation with lime, aluminium sulphate etc., is also largely used, and depends on the availability of the chemical chosen. A further method was the trickling filter, the object being to get as much air into the sewage as possible.

Mr. Griffin then went on to discuss the activated sludge process. The sludge is aerated by various methods, oxygen being necessary to the process. Much of the pioneer work was done at Manchester. Other methods involved washing the sludge to remove soluble impurities, incineration, drying for sale as a fertilizer, barging out to sea or composting. The speaker contrasted the local desire to have the sewage outfall as far as possible from the city and the pride taken in sewage plants in many places overseas.

At the meeting held on October 25th., Dr. R. A. Robinson, F.R.I.C., F.N.Z.I.C. spoke on some recent advances in physical chemistry. The speaker lucidly explained the theoretical basis of molecular rotation, and showed how this could be affected by certain high wave lengths of light in the far infra-red. He then went on to discuss molecular vibration and showed how this could be altered by light rays in the nearer infra-red about 2.5mu to 25mu called the fundamental infra-red region, and also by light rays in the overtone region 1.3 to 2.5mu. The picture was complicated by the mutual effect of rotational and vibrational changes; a practical difficulty was that these wavelengths were outside the photographic regions.

The applications of rotational spectra to theoretical chemistry were to give the distances between nuclei in molecules. The vibration spectra could be used to measure force along a valency bond, i.e. the strength of the bond. For instance in HF it is found to be 9.14 x 10^5dynes/cm

HCl	5.13
HBr	3.19
HI	3.12

For industrial work the Dow Chemical Co., U.S.A. had made an instrument for measuring the absorption spectra in the range 2.5 to 25mu. This is used (1) For identifying organic compounds (2) For detecting impurities such as CH_3CHCl_2

in chloroform or $BrCH_2CH_2CH_2Br$ in $CH_3CHBrCH_2Br$ (3) Quantitative analysis of a mixture by measuring the intensity of the absorption of the spectra.

The instrument has the advantage of speed, requires only O.1ml., and the sample is recovered undamaged.

Further applications mentioned by Dr. Robinson were; detecting the various types of synthetic rubber, following the progress of polymerisation of styrene, investigation of close boiling mixtures of terpenes, and in the analysis of o. m. and p. cresols. It could be used not only in the laboratory, but in works control.

WELLINGTON BRANCH.

The September meeting was addressed by Mr. J. N. Sutherland (of the Pathological Dept., Wellington Hospital) who took as his subject, "Chemistry in Relation to Medicine." In his opening remarks the speaker dealt with penicillin and said that susceptibility of organisms to penicillin is variable as some are penicillin sensitive at low concentrations of the drug while others are sensitive only at high and impracticable concentrations. Penicillin only attacks actively growing organisms, having little or no effect on the organisms in the quiescent state and the drug is bactericidal, interfering with bacterial respiration. As it is active in the range of enzymic reactions it is thought that the drug may initiate a bactericidal enzyme system. Many organisms, including many non pathogenic aerobes and anaerobes as well as certain pathogenic organisms, produce an enzyme penicillinase which rapidly destroys penicillin and consequently all solutions, ointments, pastilles etc. which are prepared containing penicillin must be prepared under aseptic conditions. The bactericidal effect of penicillin is not affected by the presence of proteins, and recent work has shown that the stability of penicillin is greater than was at first supposed. The administration of penicillin and some of the sulphonamides, notably sulphamethazine has been found to give rise to a synergistic reaction, the mixture being more effective than either component alone. In some cases of mixed infections penicillin is not effective against a sensitive organism. In a lesion containing both Staphylococcus aureus and M. tuberculosis (insensitive) the tubercle bacillus rapidly destroys the penicillin thus preventing the killing of the sensitive Sta-

phylococcus. Laboratory control of blood, urine, ointment pastilles etc. is carried out by biological assay.

Turning to the subject of the sulpha drugs, the speaker said that until recently the sulphonamides were considered to be bacteriostatic agents but now they are known to be bactericidal in action as they interfere with the bacterial respiration. Experiments with sulphathiazole have shown that sulphathiazole and cocarboxylase compete for carboxylase, an enzyme concerned in the bacterial metabolism of glucose, sulphathiazole inhibiting carboxylase activity. When sulphathiazole is administered, part of the drug is acetylated and part of the drug is bound to serum albumin and this fraction is considered to be inactive. The sulphonamide bound to albumin is also not removable by dialysis. It appears that protein and carboxylase compete for sulphonamides and proteins complete with the drug for carboxylase. Hence the serum albumin is capable of preventing the bactericidal union between the drug and the bacterial enzyme. The addition of cocarboxylase counteracts the inhibiting effect of sulphathiazole.

It has been noted that the removal of the 4. amino group from the benzene ring resulted in a lowering of activity against streptococcal infections but an increased activity against certain anaerobic bacteria. P. (a.aminoethyl) benzenesulphonamide showed some evidence of antibacterial activity in vitro while p.(b.aminoethyl). benzenesulphonamide showed a marked decrease or complete absence of antibacterial activity. This 4. amino group was previously considered to be essential in that position for the antibacterial action of the sulphonamides. The laboratory control consists in the colorimetric estimation of the free and acetylated drug in blood, urine and cerebrospinal fluid.

Experiments have shown that sodium sulphathiazole can be used to detect iron, cobalt and copper in the same solution and that ferrous iron can be distinguished from ferric iron readily. Cobalt solutions can be used to distinguish between sodium sulphathiazole, sodium sulphapyridine and sodium sulphadiazine.

Other activities in the clinical laboratory which aid in diagnosis are (a) Gastric analysis. Here in the test specimens, after the patient has been given a test meal, the free hydrochloric acid and the total acid, (HCl and organic acids) are estimated, while blood and starch are detected. This test aids in the diagnosis of pernicious anaemia, peptic and duodenal ulcers and cancer of the stomach. (b) Estimation of chlorides and

sugar in cerebrospinal fluid. The amounts of the substances present is of considerable diagnostic importance especially in meningococcal meningitis, tubercular meningitis and poliomyelitis (infantile paralysis).

A brief outline on the reactions of thiourea and thiouracil was given, and it was explained that laboratory control in this case takes the form of cholesterol estimations on the blood, and basal metabolic rate determinations.

ANNUAL MEETING.

At the conclusion of the business portion of the evening four short demonstrations were given, as follows:—

Mr. N. T. Clare demonstrated an apparatus for performing chromatographic analysis.

Mr. E. Freyberger explained the usage of instruments for measuring the resilience and penetration of rubber.

Mr. I. C. McDowall showed a new and convenient form of H_2S generator.

Mr. N. P. Alcorn exhibited the latest design of all-glass apparatus for the A.S.T.M. determination of sulphur in gasoline.

There was a strong feeling in evidence at this meeting that the Branch should endeavour to establish a refresher course for its members under the guidance of the University Staff. Several members spoke enthusiastically on the subject and a resolution was carried recommending the incoming committee to organise, if possible, such a series of lectures during 1946.

CANTERBURY BRANCH.

The August meeting was addressed by Mr. E. F. Schwarz on "Some Aspects of Marine Industries in New Zealand, more particularly the manufacture of Agar-Agar."

Agar production is an old industry in Japan, where the substance is called "Kanten" or "Cold Sky", as only frosty nights permit its manufacture there. Agar is the Malayan name and Agar-Agar the plural. Its technical importance derives from its capacity to form gals which are suitable for human consumption. Chemically it is a polysaccharide, whose composition has been studied, notably by E. G. Percival, but not yet solved. The gel forming qualities are outstanding. Agar retains from four to six times as much water as gelatine, and even very dilute solutions yield firm gels.

Mr. Schwarz outlined what is known or postulated about the gel structure, and listed the seaweeds used for agar production. Manufacturing processes consist of (1) extraction (2) filtration and purification of the extract (3) dialysis of the gel (4) dehydration of the gel. These processes were described in some detail, both the "picturesque" Japanese method, and the modern industrial method. The latter was illustrated by clear sketches of plant.

Agar is an essential material in bacteriology, being today practically the only culture medium. It is not attacked by liquefying bacteria, and can be repeatedly sterilised without losing its gel-forming qualities. It is also largely used in meat and fish canning instead of gelatine. Other uses are as a laxative, in condensed milk manufacture, confectionery, ice cream, cosmetics, finishing and sizing textiles and leather, and as an activator for nicotine sprays.

Agar production was profitable in New Zealand in war time, at a price of 25/- per lb., five times the average price of pre-war Japanese agar. New Zealand agar has twice the gel strength of the Japanese, thus requiring only half the quantity in practical use. It is better to handle, and has superior clarity and colour, and should always fetch a higher price. The collection of seaweed, from water never deeper than four feet, is much easier than for example in U.S.A. where one factory used a diver. Regeneration of the weed is satisfactory.

Mr. Schwarz expressed the view that the industry will continue in New Zealand, providing a considerable income to the Maori sea-weed gatherers, and a substantial export trade. Japanese exports were large, U.S.A. taking 240 tons per annum, Britain 80, Australia 15, New Zealand about 9. The sea contains wealth in various forms. Iceland and Norway provide examples of countries which have established large fish-oil and fishing industries, often working far beyond their own waters. In Scotland an industry for manufacturing algimic acid is established under much harder condition than exist for the harvesting of the raw material, giant kelp, in Cook Strait. The alkali salts of the acid give highly viscous solutions for textiles and paper sizing. The heavy metal salts are used for water-proofing fabrics, and an alginic rayon has been made. Despite certain technical difficulties, a small plant would have a good chance of success.

Dr. R. O. Page gave the September meeting the benefit of "Some Prejudices" on the future of New Zealand industry. He based his opinions on the assumptions that atomic energy can be disregarded at present, and that manufacture would be mainly for home consumption. Primary industry poses a

question. Clearly unlimited expansion is impossible. W. M. Hamilton considers that the dairy industry could increase its production by 50% in from ten to 15 years. Colin Clark says that our exports will decline to ¼ of their present volume by 1960, due to competition from margarine and synthetic fibres. A decline in exports involves a decline in imports also.

Only a moderate expansion of local secondary industry can come from replacement of imports. Recent years have shown a large increase in value of production, but a much smaller increase in volume, 23 per cent by the official index from 1937-38 to 1942-43, with an 11% increase in the number of employees. Industries such as building, fertilisers and motor assembly, which suffered restrictions in labour and materials, showed little increase in the number of employees. By contrast considerable increase was shown by industries stimulated by war, such as fruit and vegetable preservation, woollen milling, wool-scouring, linen flax, and engineering. The former group should show a post-war expansion, and contraction may occur in the latter group.

Consideration of available resources led the speaker to make some tentative suggestions. Lack of coking coal handicaps an iron industry, and the exploitation of iron sands depends on the recovery of titanium and vanadium. Coal is probably the main essential for secondary industry. New Zealand's per capita production is high, but so also is wastage. There could be great expansion in coal processing, and means are needed for using lignites.

Our primary products provide raw materials for industry. The challenge of margarine may gradually change butter production to dry and preserved milk, involving a great problem of transport reorganisation. Wool scouring, which developed to save freight, may grow further and lead to processing of by-products and even top making. Canning may suffer an initial drop, and dehydration almost certainly will, though apple dehydration should have a future. Sugar beet production is dependent on government policy and mechanisation. The world shortage of fats is stimulating vegetable oils. A deficiency of soft woods in the Pacific provides an opportunity, both for pulp and timber. Careful selection of location, and selection of forest trees on the basis of genetic principles, may make timber more promising for development than any other crop.

Dr. Page saw prospects of few large scale developments. Industry will remain small. The average number of employees

is only 19, and some 200 factories only have more than 100 on the pay-roll. Small size produces problems in training for scientific management. Such training would best be done in research associations, and the introduction of more such organisations is urgently needed.

On 26th October, Dr. F. B. Shorland spoke on "Some Aspects of Fish Oil Research with Special Reference to New Zealand."

Cod liver oil achieved its fame in the days before vitamins had been recognised, and the reason that the cod was selected was that it was the most abundantly caught fish in the North Sea having a large and oily liver.

In the Southern Hemisphere the North Sea cod (Gadus morrhua) is not found and the people in these parts have to look to other fish for liver oil production. In South Africa, the stockfish (Merluccius Capensis) as well as other species such as the kingklip (Genypterus capensis) contribute to the fish liver oil industry. The school shark (Galeorhinus australis) is the basis of the fish liver oil industry in Australia. While the New Zealand industry depends largely on this fish, edible fish including ling (Genypterus blacodes) related to the kingklip of South Africa, groper (Polyprion oxygeneios) and swordfish (Makaira marlina) also contribute.

Arising from the discovery made by Denz and Shorland who reported in 1934 that the larger edible fish of Cook Strait, including groper, bass, ling and English hake, yielded liver oils far richer in vitamin A than those normally produced elsewhere, there were produced annually from 1934 to 1938 at Island Bay 100 to 144 gallons of ling liver oil for export to Great Britain. The first large scale production, however, was undertaken by R. Greenwell in 1942 at Howick, Auckland. On March 4th, 1943, Karitane Products Ltd., Wellington, opened their factory at Island Bay. These two factories now collect practically all the available livers from all parts of New Zealand. The livers are frozen at the fishing ports in ten gallon fishing cans and transported frozen to the factory. In the far north where no transport is available, R. Greenwell has subsidiary factories at Parengarenga harbour and Awanui. The present annual production is calculated to exceed 25,000 gallons or 500,000 gallons expressed in vitamin A equivalents of cod liver oil, as compared with the pre-war New Foundland annual production of approximately 230,000 gallons or 2,000,000 gallons produced in Great Britain.

The question may well be asked as to how New Zealand with

limited fishing resources, producing annually but 400,000 cwt. of fish as compared with 20,000,000 cwt. produced in Great Britain, can support such a relatively large fish liver oil industry. The main reason for this apparent paradox lies in the fact that the school shark, on which the local industry is largely based, contains 2.8 times as much liver oil and 80 times as much vitamin A weight for weight of fish as the North Sea cod.

The livers vary in size from over 100 lbs. as in the white shark (Carcharodon cacharias) to less than 2 ozs. as in the barracouta. The school shark liver averages 3 to 4 lbs. There is a limit to the utilizable size because the labour of separating a very small liver is not worth while to the fisherman. In regard to oil content, some shark livers contain more than 70% while groper livers sometimes contain as little as 5% oil. The vitamin A content varies from undetectable amounts as in certain specimens of blue shark liver oil to over 24% in some swordfish liver oils. This may be compared with cod liver oil containing 0.04% vitamin A. The liver may comprise but 1.31% of the fish as in the kingfish or as much as 20% as in certain school sharks; the average figure for the latter, however, is approximately 10%.

The earlier hypothesis that the fish derive their vitamin A from the diatoms cannot be satisfactorily established since the zooplankton, which form an essential link in the chain of events, are devoid of vitamin A so that we are now forced to hold the less attractive theory that the fish has to synthesise vitamin A for itself. Similarly the theory put forward by Bills of total synthesis of vitamin D is the only one so far advanced which is consistent with the known facts.

Local fish oil production provides for a large exportable surplus of vitamin A but there is a relative deficiency of vitamin D since the only commercially important liver oils containing appreciable amounts of this vitamin are the groper and ling. From a commercial angle this is not important since synthetic vitamin D, calciferol, may be added cheaply to fortify the natural oil.

The New Zealand factories use modern centrifugal methods for the processing of the liver oil. The hard frozen livers are minced and digested with an appropriate volume of water at a given temperature. Sometimes caustic soda is added or a pepsin-hydrochloric acid digestion is used, as in the case of groper livers. The exact conditions vary with the type of

liver being processed. The digest is then passed through a super-centrifuge and the oil is separated from the stick water or non-oily residue.

Vitamin concentrates are not yet prepared to any appreciable extent in New Zealand, although it may confidently be expected that this development will take place in the near future. Much of the locally produced fish oil is already highly concentrated in respect to vitamin A and a concentrated preparation "Adeol" is being made by the addition of calciferol. This preparation corresponds to the half strength specifications for Liquor Vitaminorum A et D Concentratus of the British Pharmacopoeia.

In the raw state, as is well known, fish liver oils are unpleasant in taste and odour. A process which achieves the concentration and separation of vitamins economically and in quantity, producing at the same time a palatable product suitable for medicinal use and for the enrichment of foodstuffs, is obviously of considerable value. There are three main methods of concentration of vitamins in fish oils:

(1) Differential extraction which depends on the fact that the oil which is first released by freezing and thawing is poorer in vitamin A than the whole oil.

(2) Saponification followed by extraction of unsaponifiable matter with solvents.

(3) Molecular distillation.

The vitamin A concentrates of more than 1,000,000 I.U. per gram are prepared in the British Drug Houses, London, by distillation of the unsaponifiable matter from which the sterols are first removed by crystallization from cold alcohol. Distillation Products in U.S.A., on the other hand using the centrifugal still prepare concentrates of 180,000 I.U. per gram by direct distillation of low potency fish oils. Such concentrates find ready application in the fortification of foodstuffs, especially margarine.

OTAGO BRANCH.

At the August meeting of the Otago Branch Miss N. Woods discussed a new American method for the determination of the density of plasma and whole blood.

From the density of plasma and blood several things, such as the amount of blood protein can be calculated. This in-

formation is very useful in the diagnosis and treatment of cholera, dysentery, etc., and in following the progress of patients suffering from burns, trauma (bruising), etc. An indication is given as to whether whole blood plasma, or saline should be given in transfusion, and, if there is insufficient for all cases, which need transfusions most.

In principle the new method is very simple. A series of tubes of $CuSO_4$ solutions of known densities is used, and a drop of blood or plasma allowed to fall into a tube of density close to that expected. Each drop on entering the solution becomes increased in copper proteinate, and remains as a discrete drop for 15 — 20 secs. The drop breaks through the surface film of the solution, and goes 2-3cm. below the surface. Within 5 secs. the momentum of the fall is lost, and the drop either rises, falls, or is stationery. The blood must of course have been cooled to room temperature.

It is claimed that, since no balance is necessary for making up the solutions, the method is particularly suited for use in the navy. A saturated solution of $CuSO_4$ is prepared by shaking vigorously 4lb $CuSO_4$ in 2.5 litres water for five minutes and immediately filtering off the solution. This is then made up to a definite volume—according to the temperature of the solution—to give a solution of d=1.100. This standard is in turn diluted to give solutions of the required densities.

An accuracy of 1 in 10^3 is claimed for these solutions. This is hard to reconcile with among other things, the recommended use of a 500 c.c. measuring cylinder. During the discussion several speakers were sceptical of the accuracy resulting. from such methods of saturation and dilution.

The Sepember meeting of the Otago Branch was the "Current Research at the University" Meeting. Mr. B. S. Painter discussed "The Mechanism of the Iodination of Phenol and the Weak Acid Catalysis."

He examined the iodination of phenol in aqueous solutions and the found reaction to be catalysed by weak acids. From a kinetic study of the reaction a mechanism was put forward for the catalysis involving reaction between acyl hypoiodites and the phenoxide ions. Alternative mechanisms were put forward for the uncatalysed reaction. A study of the uncatalysed iodination of anisole failed to differentiate between the two possibilities. A correlation was obtained between the catalytic effects of some weak acids and their ionisation constants.

Mr. R. D. Batt described a reexamination of the terpene fraction of the essential oil of Libocedrus Bidwillii using a

highly efficient column of the Lecky and Ewell spiral gauze type.

Modified points in design and construction procedure were necessary. Tests indicated that the column had an efficiency of forty theoretical plates. The oil, extracted by steam distillation of the autumn leaves and terminal twigs of the tree, was fractionated at ten milli-metres pressure into six fractions over the terpene range.

The first three fractions were identified as l alpha pinene, d sabinene and myncene, The fourth fraction was an exygenated compound $C_{10}H_{14}O$ which quantitive experiments showed to be a ketone.

The fifth fraction was a mixture of limonene and dipentene.

The last fraction was not investigated chemically.

Mr. J. Murray had studied olearyl oxide, a diterpene compound from the leaf-oil of Olearia paniculata. Two methods of dehydrogenation were tried, using palladiumised charcoal and selenium. The first proved unsatisfactory, while the second gave a small yield of liquid product from which 1:2:5-trimethylnaphthalene was isolated through the picrate. A synthetic specimen of this hydrocarbon was prepared and proved identical with that from the dehydrogenation mixture. A picrate from a high-boiling component of this mixture was also obtained, but was not indentified. The latter was obtained similarly from the catalytic dehydrogenation in small yield.

Miss R. P. Mauger's subject was "Acid Catalysis in the Formation of Chloroamides from Hypochlorous Aid."

Evidence was given for the view that the formation of chloroamides from hypochlorous acid involves the hypochlorite ion as chlorinating agent. N-methyl acetamide and acetyl glycine are N-chlorinated in this way and in addition the rates are dependent on the products of the concentrations of hypochlorous acid and of the free acid used as a component of the buffering solution. This was interpreted in terms of the formation of acyl hypochlorites which act as chlorinating agents. With acetanilides, this latter mechanism appears to be absent, and N-chlorination by hypochlorous acid is apparently determined solely by the first mechanism. N-chlorination by hypochlorous acid, by chlorine, by another chloroamine and by acyl hypochlorite are separate and distinct mechanisms.

CORRESPONDENCE.

The Editor, Journal of the N.Z.I.C.
Dear Sir,

In support of the remarks of Dr. Shorland (Journal for December, 1945, P.7) about the type of contribution made to the Annual Conference, I suggest that at the next meeting a lecture, or a series of two or even three lectures, be given on one of the following topics: (a) the significance of ionic exchange in soil chemistry, (b) the physical chemistry of carbonaceous materials, (c) recent theories of bacteriostatic action; (b) and (c) are of sufficient topical interest to attract treatment in recent issues of the Annual Report of the Chemical Society. I have selected these as representative of advances in pure science which should be of immediate importance to New Zealand industries, and have attempted to steer a course between those contributions to pure chemistry of so abstract a nature that their immediate utility is difficult to perceive, and on the other hand those severely technical advances which would be of value only to the few concerned with a particular industry. The selected lectures should not be given by a member of the University staff, who already have ample opportunity at local meetings to comment on recent advances in their own fields. I suggest that there are many members of the Institute in a better position to maintain a proper balance between fundamental discoveries and their application to New Zealand problems.

R. A. ROBINSON.

BACK NUMBERS OF THE JOURNAL.

The following back numbers of the Journal are required to make up a reserve:—

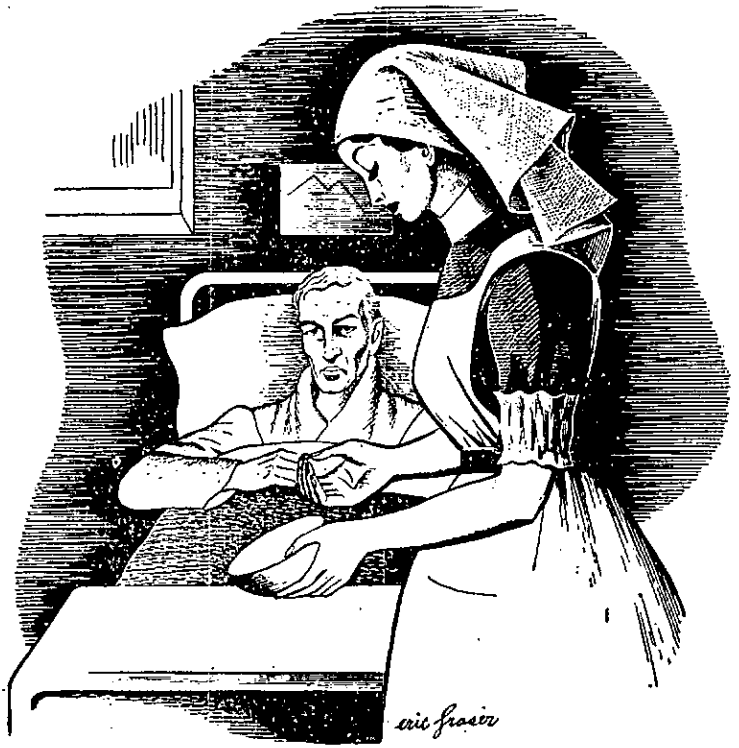
1941 September and December.
1942 June and September.
1943 December.
1944 March, September and December.
1945 March and June.

Members willing to give their back numbers would render a service by sending them to the Editor.

Correspondence should be addressed to Dr. H. N. Parton, Canterbury College, Christchurch.

The address of the Hon. Secretary is P.O. Box 250, Wellington.

MEDICINE



The patient of today takes most of his medicine in tablets or capsules. No longer need he swallow the unpleasant draughts of his grandparents' days. We owe this change, among other medical improvements, largely to the work of the research chemist and the chemical industry. From earliest times Man has known that remedies for many of his ailments were to be found in the roots, bark, leaves and berries of trees and plants. These were the subject of study and experiment by the alchemists of the Middle Ages. In more modern times scientists were able to sift real knowledge from superstition and quackery. The first stage was for chemical research to produce pure drugs, such for example as quinine, strychnine, morphine, cocaine and atropine, from the old vegetable sources. The next stage in the laboratory was to analyse these and find which could be made synthetically by chemical means. The third stage, on which British chemical research is now engaged, is to develop the great field of organic chemistry to find entirely new and hitherto undreamt-of specifics for the benefit of Mankind—to prevent sickness as well as to relieve and cure disease.

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