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EDITORIAL

We have published in earlier numbers correspondence from members on qualifications for membership of the Institute. We remain of the opinion, in agreement with the President, that the present arrangement of three grades of members gives desirable elasticity if worked in the right spirit. We agree also with Mr. Leese, that taking into consideration cost of education and cost of living, the salaries paid to scientific workers are too low compared with those in other countries, and that it is our duty as chemists to make the status of chemistry financially and academically of a high standard. In closing this correspondence, we should like to make the suggestion—by no means a new one—that the Branches should take steps to see that their respective centres should have operating either in the University Colleges or the Technical Colleges, a course of training in chemistry suitable for the growing number of men in industry to whom some knowledge of chemical principles and analytical operations would be invaluable. The practical application of the results obtained by the research institutes must be made by men whom the President called "industrialists with a knowledge of science." How they shall gain that knowledge is a problem in which the Institute should interest itself. It is not an easy problem to solve. The needs of men in control of various industries are not identical, but it should be possible to devise a course covering the fundamental principles which are in common, and the rest may be left to the initiative and practical experience of men themselves. The fact that attempts in this direction have not been successful in the past should not prevent the problem being reconsidered at intervals. The time may be opportune now.

CORRESPONDENCE.

All communications should be sent to Dr. H. N. Parton, Chemistry Dept, Canterbury College, Christchurch.

J. S. MACLAURIN, D.Sc., F.R.S.,N.Z.

1864-1939

On the 19th January, 1939, Dr. J. S. Maclaurin recognised throughout New Zealand as one of its leading scientific men, passed to his rest. He had lived in the Dominion since boyhood, and may be fairly claimed as a New Zealander.

He studied chemistry at the Auckland University College under Professor F. D. Brown, and in 1897 was awarded his doctorate for a thesis on the subject "The Dissolution of Gold in Potassium Cyanide Solutions." In a very brilliant manner he demonstrated that oxygen was necessary for the solution of the gold, and on this basis explained why dilute solutions of cyanide were the most effective. His work greatly influenced the subsequent development of the cyanide process which, then in its infancy, is now responsible for the recovery of half the gold won each year in the world. He was offered a position with the Waihi Gold Mining Company and was also awarded an 1851 Exhibition Scholarship, but declined both to continue as a private analyst in Auckland. The scholarship was subsequently awarded to Ernest, afterwards Lord Rutherford. In 1901 he was appointed Colonial Analyst at Wellington (the title was changed later to that of Dominion Analyst) a position he held for 30 years. His work during this period covered a wide range. The major investigations included coal, coal-dust explosions and safety in mines, the radio-activity of springs and deposits in the thermal regions, also of sea water in the Pacific, and on the industrial side, the manufacture of dried milk, the purification of kauri gum "chips" by an ingenious process of flotation, bleaching of phormium (flax) fibre, and an explosion process for the production of fibre from phormium.

He had an ambition to find in New Zealand an element to fill one of the gaps in the periodic table, and examined with great care every unusual mineral sample, and all mineral waters. A bluish colouration on some bricks was traced to vanadium. Some small heavy crystals from an Otago stream raised high hopes. Misled by a faulty textbook, and with 0.2 grams of material, he worked for some weeks to find in the end that the unknown was zirconium. His element, "Zealandium" will now remain a dream.

Skill, patience, and minute attention to detail characterised all Dr. Maclaurin's chemical work. He would go to endless trouble to be sure of his ground. To justify the raising of the

minimum legal standard for fat in milk from 3.0 to 3.25%, he analysed 1600 samples of milk from widely differing herds in all parts of New Zealand during spring and summer months, when the fat is lowest. No challenge of the standard afterwards by interested persons had the slightest hope of success.

Regulations under the Sale of Foods and Drugs Act drafted in conjunction with Drs. Makgill and Frengley, and Gas Regulations drafted in co-operation with Mr. J. W. Collins of the Industries and Commerce Department, adequately safeguarded consumers and were not restrictive to industry because of full and frequent prior consultations with manufacturers concerned. In administration he was open-minded, with an almost judicial faculty. As a court witness he was scrupulously fair, and his evidence was never shaken. His personal qualities gained for him the respect and affection of his staff, among whom he was generally referred to as "the Chief." In his earlier years he had served on the Council of the Auckland University College, and also been active in the New Zealand Institute. Indifferent health precluded him from such activities in later life. He was favourable to the formation of the New Zealand Institute of Chemistry, though he did not become a member.

Joining the Government service in 1901, with a cadet assistant, Dr. Maclaurin left behind him in 1930 the best chemical organisation in New Zealand, and an example of unselfish, untiring scientific service of a standard which will remain an ideal and an inspiration to all scientific workers, especially in the Dominion Laboratory, where he spent so many happy and fruitful years.—W.D.

"*A good name is rather to be chosen than great riches.*"

The Hooker Scientific Library, operated as a nonprofit institution by Central College, has inaugurated a new service for chemists who lack convenient access to chemical reference works. For a nominal fee the Library will send data on any question which can be answered by reference to a chemical manual, dictionary or index such as Beilstein, Mellor, Thorpe, Ullman, formula indexes and the like. Inquiries taking too much time for the low fixed rate will be answered at a proportionately higher cost, for which estimates can be rendered in advance. Full details will be sent in response to requests addressed to:

Hooker Scientific Library, Central College, Fayette, Missouri.

BRANCH NOTES

AUCKLAND BRANCH

Mr. Charles Barnard addressed the July meeting on "The Manufacture of Photographic Plates and Papers."

For several years Mr. Barnard was associated with the English Photographic Firm of Ilford Limited, and was able to entertain his listeners with many tales of the earlier days in the industry. In those days manufacturers were not able to purchase their machinery and had to devise their own, and Mr. Barnard described several ingenious devices that his firm had been responsible for. The difficulties were multiplied because manufacturers of plate glass and of gelatine did not find it worth their while to turn out a special product for the then rather insignificant photographic industry. Many of these difficulties are, of course, non-existent to-day.

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In August Mr. W. L. Barr discussed "Recent Developments in Oil Technology."

The paper outlined some of the methods adopted to increase the yield of aviation and of motor spirit from petroleum by pyrolysis of the heavier fractions, and by polymerisation of the olefinic gases formed as a by-product of this process. There was brief reference to the variety of substances manufactured from these gases, and methods were described for the synthesis of some of the components of aviation fuels for modern high compression engines. Recent investigation on the chemical natures of petroleum oils were summarised; and in conclusion a description was given of the methods of Waterman, Vlugter, and Van Westen, by which the proportion of carbon atoms in aromatic rings, in cycloparaffinic rings and in side chains may be derived from the average molecular weight and certain physical constants of the oil.

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It has been the custom for several years for the members of the Auckland Branch to hear chemistry students of the University College speak on the researches they are doing.

The students themselves probably benefit from the experience of having to speak on their particular subject and having to reply to questions and perhaps criticism on their work.

From the point of view of the members it is of interest to hear what work is being done by the students of the College,

as this is one of the only chances they have of meeting them. Further, it serves to brush up a little in the way of research technique which they have forgotten since leaving College themselves, and find little call to use in their daily work.

The following papers were read this year at the September meeting.

Mr. R. P. Newbold: "The Constitution of Solasodine."
Mr. M. D. Sutherland: "The Essential Oil of Cupressus Macrocarpa."
Mr. J. W. Lyttelton: "The action of Hydrazoic acid on substituted Benzoic acids."
Mr. J. B. Brown: "Syntheses in the Phenenthrene series."
Mr. H. D. Orchiston: "Phase rule studies in the Nickel Phosphate Series."

WELLINGTON BRANCH.

Recent lectures to the Wellington Branch have been given by Dr. J. Melville on "The Viruses," Dr. J. K. Dixon on "Some Chemical Aspects of Soil Work," and the Annual Meeting was addressed by Dr. V. A. Armstrong on "Alternative Motor Fuels."

Dr. Dixon's lecture dealt with the effect of geology, climate and vegetation on soil formation. In the past the parent rock had been taken to classify the soil but Russian work with its emphasis on climate and vegetation had completely altered our concepts. The modern outlook, intermediate between the old and new approaches, placed the three factors in their proper proportion. The effects of the separate single factors and their assessment were dealt with.

Climate was shown to be largely a matter of "effective" rainfall and this was governed by rainfall and evaporation. Ratios such as the Meyer ratio, rainfall/saturation deficit give a good measure of effective rainfall. The higher the ratio the greater the penetration of rain water and the greater the opportunity for hydrolysis of the clay complex and interaction with carbonic acid in the soil water. High Meyer ratios are commonly found in New Zealand with a resultant prevalence of leached soils low in plant nutrients.

While the general effect of rainfall is to leach nutrients from the soil, the usual result of vegetation is to return nutrients to the top-soil for the roots in the subsoil are collectors for the plant and when leaf-fall occurs, the bases etc., in the leaves are returned to the top-soil. Chemical data was

presented to show the differences between New Zealand trees in their ultimate effect on the soil.

The third factor, parent material, was shown to be important by the comparison of two soil types under the same climate and vegetation cover. The soils had some similarities but also had marked differences.

Finally the clay complex was considered as a weak, insoluble acid and the chemical reactions involved in leaching, salinisation, liming, shown by means of equations.

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Dr. Armstrong said that Germany produces between 60 and 70 per cent of her peace time consumption of liquid fuels by means of the hydrogenation and Fischer Tropsch processes (for petrol and diesel oils), benzole from gasworks and coke ovens, and alcohol from such materials as molasses, potatoes, etc. Even with full control of the Rumanian fields she does not attain self sufficiency because of the lack of sufficient transport facilities. Perhaps, because the oil cannot be moved to Germany, Germany has moved to the oil.

Italy imported over 75 per cent of her oil from sources which are no longer open to her and if Japan enters the war she also will be cut off from 80 per cent of her oil. In spite of large storage of oil in both Germany and Italy the former should be able to last not more than another year and the latter not more than a few months longer. Also a certain amount of transport must be maintained in the conquered countries thus causing a further drain on resources. It is just this shortage which is causing the Axis powers to intensify their drive towards the oil reserves of the East.

The speaker then outlined the various methods of producing alternative motor fuels and also their characteristics and use.

In the realm of solid fuels, coal dust engines and steam and electric vehicles have each their supporters. Owing to increased knowledge of steels, liners had been found for coal dust engines which reduced wear to a minimum. A great difficulty was the introduction of the fuel into the cylinders. Gas companies in England ran buses on coke fired boilers and many undertakings used electric vehicles for short distances.

In the matter of shale oil, though there was large production in Scotland, it was unlikely that New Zealand reserves would be extensive enough to warrant the erection of a large

plant. The question of the amount of sulphur in our shales was also an important one.

Synthetic ammonia has been used in Italy as a fuel.

The lecturer then went on to describe the hydrogenation of coal and the Fischer Tropsch synthesis process, both of which are future possibilities in New Zealand. At present their capital cost would appear to be too high.

Benzole is another fuel of great importance for blending with petrol and alcohols. The Benzole could be recovered at all gasworks by quite simple means and though not a large source of alternative fuel in New Zealand it would help considerably. It is unlikely that alcohol could be produced cheaply in New Zealand. From potatoes, maize or wheat, the cost would be excessive. If molasses could be imported cheaply this would be very satisfactory as it is a most bountiful source. Synthetic methods from coal by processes similar to the Fischer Tropsch are expensive.

Such easily liquifiable gases as propane and butane are not available in New Zealand, nor is methane. The two former are available from natural gas and also as by-products of coal hydrogenation while sources of supply of the latter are to be found in blow holes of mines, coke oven gas, natural gas and sewage disposal works. Their high calorific values make these gases extremely useful.

Acetylene is another fuel but is prohibitive in price. Hydrogen, produced by electrolysis has also been used and its use led to the development of the Erren engine working on a forced injection principle and applicable to water gas and town gas. This cycle gives much greater efficiency and higher performance than ordinary engines.

Given cheaper gas and a supply of light cylinders compressed town gas could make a very satisfactory substitute fuel in New Zealand. Questions of distribution might offer some difficulty but in the cities this should not occur.

Finally Dr. Armstrong dealt with the question of the producer gas vehicle and described different types and their characteristics. The difficulties of obtaining fuels with satisfactory characteristics and of devising filtration systems was dealt with. Charcoal appeared to be the most satisfactory fuel but as it required frequent charging because of small bulk density, investigations on New Zealand coals and cokes on lines similar to those carried out in Great Britain were necessary.

The speaker then issued a word of warning as to com-

paring producer fuel costs and petrol costs with producers, such things as extra servicing, increased engine wear, extra equipment, possible pay load loss, more frequent changing of oil for engine lubrication, lower power output, trouble from clinker and difficulty in obtaining standard fuel were unknown cost factors, as yet, and it is necessary to remind people that it is only an emergency measure and not a regular substitute. That it is not normally economic is borne out by the fact that in France Germany and Belgium, even with the aid of a Government subsidy, comparatively little conversion to producer gas took place. If and when a suitable engine is designed then producer gas may offer an all-time alternative to petrol.

Before concluding, Dr. Armstrong stated that it would be absolutely necessary for the Government to make home produced fuels tax free. He also drew a parallel between Germany, where necessity for independence had known no economic laws, and the democracies, where it appeared that independence was apparently being postponed until world petroleum reserves were exhausted. : : : : :

Personal.

H. F. Harvey has returned to Australia. Dr. J. K. Dixon was co-opted to replace him on the Committee.

The Dominion Analyst, Mr. W. Donovan, is to retire at the end of November.

Four members, M. S. Carrie, K. W. R. Glasgow, S. W. Josland and N. J. Ellison, are serving with the Forces overseas.

CANTERBURY BRANCH.

For the August meeting, the Branch had the pleasure of a visit from the President, Dr. Gardner. A number of members were able to meet Dr. Gardner at lunch, and he also attended a Committee meeting.

In his lecture to the Branch, the President related some of his experiences as a consulting chemist, the talk being in many ways complementary to his presidential address last January. This Branch has no one among its members carrying out similar work to that of Dr. Gardner and the corresponding laboratories in Wellington and Auckland, so the lecture was of very special interest. Public analysts have played a very large part in New Zealand, as well as in England, in building up the status of the chemistry profession. Some of their achievements are necessarily not available for treatment in lecture form, since the results are the property of the firms

consulting them. Dr. Gardner was able, however, to relate enough of his work in recent years to make it clear to members that he plays a valuable part in Dunedin's industrial life. His visit was an outstanding event in the year's programme.

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The September meeting was addressed by Dr. Rosa Stern, whose subject was "Enzymes in Industry."

She pointed out that the industries based on enzymatic effects belong to the most essential human activities, and are close to agricultural production for which reasons they should be of particular interest in N.Z.

The main characteristics of enzymes were dealt with, viz., their formation by living processes, catalyst action, specificity, response to temperature, pH and oxidation-reduction potential.

Enzymes are used industrially because of their economy and the gentle conditions under which they display their activity. The enzyme groups mainly involved in industrial processes are the carbohydrases, proteases, lipases, and the enzymes causing various fermentations to take place.

Industries based on enzymatic processes are: (1) fermentation industry, comprising the productions of beer, spirit, compressed yeast, higher alcohols, esters, ketones, glycerol, and organic acids; (2) Food industry, comprising bread baking, productions of malt extracts, soft drinks, vinegar, cheese; (3) Leather manufacture; (4) Tobacco fermentation, flax retting.

The use of enzymes is not essential but useful, and therefore widely practised in the following industries: Textile industry, soap industry, confectionery, pectin production, meat freezing, production of yeast extracts, pharmaceutical industry, etc. The applications made of the enzymes in all these industries were discussed, and problems arising in different fields pointed out; e.g., the problem of utilising farm wastage as a raw material for biological manufacturing processes. The growing importance of such biological processes based on the metabolism of micro organisms was further emphasised.

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At the October meeting Dr. H. C. Holland spoke on "Some English Industrial Research Institutions."

Before describing the Research Institutions a short account was given of research work done at Leeds University on the chromium salts of organic acids in relation to chrome tanning. The materials used were formate, acetate, oxalate, malonate, succinate, phthalate, maleate, fumerate, adipate, suberate and azelate. Of these the most interesting were the salts of the

dibasic acids, where the number of the carbon atoms between the carboxyl groups was two or more, as ring formation, which occurred with oxalate and malonate, was precluded and the organic ions were able to link up different chrome complexes and thus increase the amount of chromium fixed to the protein. Succinate, phthalate, fumerate and adipate were the most effective, as the ones with long CH_2 chains between the carboxyls had a tendency to precipitate the chromium. The two stereochemical isomers, maleate and fumerate, showed great differences as the cis position in the maleate prevented the linking up of chrome complexes. The action of the organic radicles in chrome leather is similar to their action in the alkyd synthetic resins where increasing flexibility is obtained in the resin as the number of CH_2 groups in the dibasic acid is increased. This offers possibilities of dispensing with one of the most troublesome process in leather manufacture, that of "fat-liquoring" with emulsions of oils, as it was shown that the desired softness could be obtained by use of some of these organic salts.

A description of the industrial research activities of the Northern Universities, some of the Technical Colleges and the Wool, Leather, and Boot and Shoe Research Associations was given, followed by descriptions of some of the industrial laboratories including the new research laboratories of I.C.I. at Blackley, in Manchester, where about 600 chemists are employed. It was pointed out that the Technical Colleges occupy a very important place in the industrial world in England and that they have very comprehensive courses, including preparation of students for internal London University degrees. The view was expressed that Britain seems to be very wide awake to the necessity for applying science to industry and the size of the laboratory staffs in a number of typical industrial plants was quoted in support of this. The Research Association movement seems to have been a great success and much of the appreciation for the need of scientific workers in industry is due to the work of the D.S.I.R.. An account was also given of some of the progress made in the elimination of industrial hazards and in the design and layout of factories.

OTAGO BRANCH.

The evening of August 14th was devoted to "Current Research at Otago University."

Mr. C. L. Carter spoke on "Karakin," which is isolated from the poisonous karaka berries. The nuts have been previ-

ously investigated by Aston and Easterfield (Trans. N.Z. Inst XXXIV, 495) who obtained a white crystalline substance, karakin, which melted at 122 deg. C. and was stated to be a glucoside of the formula $(C_5H_8O_5N)_3$.

The nuts were also found to contain glucose and mannose as well as a saponifiable oil.

Karakin was further investigated by M. S. Carrie, at Otago University (J.S.C.I, 1935) who found that it resembled, in a remarkable manner, a glucoside hiptagin isolated by K. Gorter, of Burtenzorg, Java, from the root-bark of hiptage.

By hydrolysis of karakin Carrie isolated hiptagenic acid (m.pt. 68 deg, C.) which showed no depression of the melting point when mixed with a specimen of hiptagenic acid isolated from hiptage.

During the past two years work has been carried out at the Medical School of the Otago University on the toxicity of karakin by Dr. Muriel Bell and results of this work are awaiting publication. The chemical investigation is nearing completion with the discovery that hiptagin $C_{10}H_{14}O_9N_2 \frac{1}{2} H_2O$ and karakin are identical in chemical formula and that the two substances differ only in certain physical properties such as melting point and optical rotation.

Hydrolysis of karakin has been shown to give, besides hiptagenic acid, carbon dioxide and an amino-hexose which, with phenylhydrazine, gives glucosazone. The hydrolysis of karakin is expressed by the equation:

$$\underset{\text{karakin}}{C_{10}H_{14}O_9N_2} + 2H_2O = \underset{\text{hiptagenic acid.}}{C_3H_5O_4N} + C_6H_{13}O_5N + CO_2$$

Hydrolysis with hydrochloric acid in 90% ethyl alcohol yielded the ethyl ester of hiptagenic acid which, with ammonia, yielded hiptagenamide m.pt. 98 deg. C.

Hydrolysis of the glucoside is most easily accomplished by solution in 10% ammonia when hiptagenamide is produced. This seems to indicate that karakin is an ester of sugar rather than an ether which is the usual form of a glucoside.

The constitution of hiptagenic acid is not yet definitely settled. It has been definitely shown to be a monobasic carboxylic acid and an attempted synthesis of the acid now in progress may solve this interesting problem.

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Mr. W. S. Metcalf spoke on "Ultra-violet Absorption Spectra."

When light falls on a substance it is either reflected, transmitted or absorbed. The fraction absorbed is constant

at any one wavelength and is measured by an ultra-violet spectrophotometer. This fraction is proportional to the concentration C and the cell length D; the molecular extinction coefficient is a measure of the absorption defined by $\frac{E}{CD}$ where E is the fraction of light absorbed. This is plotted against the wavelength. The curves so obtained are of two types, the R or simple type, and the K type due to conjugated systems. Chloroamines give absorption of the R type, and the substitution of hydrogen by alkyl groups in chloroamine (NH_2Cl) causes the band head to shift toward the visible. Such observations require to be coordinated with modern electronic theory.

Absorption spectra are of use in determining quantitively the constituents of a chemical equilibrium. The calculation of the ionization constant of hypochlorous acid can thus be achieved. The effect of pH on the reaction of chlorine with aqueous ammonia is a possible application.

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Mr. F. N. Fastier dealt with an important application of absorption spectrophotometry: "The solution of problems of structure, with reference to the structure of Acetanilide."

The ultra-violet absorption spectra of different anilides has been examined and various effects traced to substituents in different positions. The evidence for lactim and other structures postulated for acetanilide was found to be unsatisfactory and the molecule is believed to be a resonance hybrid. To test this hypothesis, the heats of combustion of several anilides have been determined with favourable results.

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"Some Aspects of the Mineral Resources of New Zealand."

On September 11th, Dr. F. J. Turner, Lecturer in Geology at Otago University, gave a topical and very informative lecture on the occurence of minerals in this country. Dr. Turner began by giving a short account of the way different mineral deposits have been formed, and then he dealt with the different metals individually. He said that iron ores occur at Onekaka and Taranaki. At Patea, there are 10-12 million tons of iron sand at one place and many million tons at other places. Dr. Hutton has recently shown that these deposits have been formed by wind concentration of material washed down from Egmont. These sands are magnetite containing a high proportion of titanium and vanadium, and the successful working of them is a problem. No aluminium ores

are known. Bauxite is formed only in monsoonal countries such as India, but conditions for its formation are nearly approached in North Auckland and there might be bauxite there—so far none has been discovered. Manganese usually occurs to the extent of 1-2 parts per 1000, replacing iron and magnesium in common rocks. It is removed by weathering and might later be precipitated as oxides in sedimentary rocks. The best deposits are at Whangarei, Waiheke Island in the Hauraki Gulf, Bombay (near Auckland), and at Taieri mouth. At the last place only 100 tons of pyrolusite have been mined.

Chromite nearly always occurs as an early product of the crystallisation of igneous magmas, rich in magnesium. New Zealand is quite famous for its olivine rocks, e.g. in Nelson, Westland and Western Otago. Some chromite has been obtained in Nelson and the prospects for small deposits are quite hopeful, though inaccessibility of the districts concerned would render economic working of chromite difficult.

Gold and silver are found round the Hauraki Gulf, gold in the Reefton district, Westland, and various parts of Otago. Cinnabar occurs near the Bay of Islands. It is one of the few deposits in the British Empire and is worth consideration, but unfortunately, is of only small extent.

The scheelite at Glenorchy and Macraes, in Otago, occurs in massive quartz lodes and the deposits might be quite rich, but require extensive investigation. It has been worked only spasmodically when high prices for tungsten made it possible. The deposits are thought to originate from a huge, but as yet unexposed, mass of granite underneath.

There is some tinstone, and also wolfram, at Stewart Island, but so far the Empire obtained ample tin from Malay. Stewart Island also has some mica, which is also found in the fjord country. There is asbestos in Nelson and talc in Otago. Glauconite, a potassium iron silicate, is present in large quantities in New Zealand and might be an economic source of potassium.

Finally Dr. Turner emphasised that many of the deposits are small and could not be worked economically. Most of them could not be worked by ordinary companies. Many companies have been formed to exploit deposits of smaller value than the share capital.

Coal is good and abundant. Oil shales probably could be worked. There are lots of indications of petroleum, but only

the big oil companies can afford to carry out the prospecting for it, and the chances of discovery of petroleum even by these can not be regarded as great.

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On October 16th, the Branch was visited by Mr. E. W. Hullett, chief chemist of the Wheat Research Institute, Christchurch, who spoke on the work of the Institute. Mr. Hullett said that most people preferred a fine texture in bread. The only ingredient which varied much was the flour. Formerly bakers made their own yeast and this was a frequent source of trouble, but now almost all of them buy compressed yeast, which is of uniform quality. Up to 1928 increasing quantities of Canadian flour were imported, as the addition of this to local flours gave the bread a better texture. In this year the Wheat Research Institute was established. It was controlled by a Council representing the wheatgrowers, millers and bakers, and the D.S.I.R., and its aim was to aid any section.

Wheat breeding was done at Lincoln, and the laboratory in Christchurch assisted the breeder in choosing wheats. Field tests of wheats were carried out in a number of districts in co-operation with the Department of Agriculture. Now that harvesting and threshing was largely done in one operation by headers, the wheat had to be tested for moisture to ensure that it was not cut too soon. Thousands of such tests were done every year. The wheat industry was under Government control and the mills worked under the quota system. The Institute checked the quality of the flour produced. There was a wide variation in the baking quality of wheat even between the same kind, grown on the same farm, but in different fields. The quality of the resultant flour could only be told by tests unless it was very bad. Most mills bought their wheat over a wide area and mixed the different lots to neutralise variations as much as possible. This was important because a change in the quality of the flour might necessitate a change in the routine of baking, which was most undesirable in a commercial bakery. The Institute maintained very close touch with the 40 mills in New Zealand, but it was not possible to keep in such close touch with the 700 bakers.

Baking is a highly skilled business. The moulding of the dough is an art, but machinery is largely used now for dough manipulations. An expert baker from the Institute visits the bakers and works with them for a time if necessary. There is a scheme in operation to give young bakers a course of training. An explanation of the chemistry of baking largely

awaited progress in biochemistry, as it involved complex substances, proteins and enzymes. It was gluten—a protein of unknown nature—which conferred elasticity on the dough. Besides producing gases, the yeast changed the physical properties of the dough. The fermentation time before rounding up was important and depended on the flour—hence the need for uniformity. While a good deal of the laboratory work was service work, yet every endeavour was made to further a research programme. The service work was invaluable because it kept the staff in touch with current problems and provided the material for research.

Finally Mr. Hullett referred to "wheat germ" bread. He said that wheat germ contained reduced glutathione, which spoiled the dough. It was not definitely known why. By prefermentation of wheat germ the glutathione was destroyed and then the germ could be mixed with flour and normal bread made. This bread has a distinctive taste which is pleasant to most, but not to all consumers. In any case there is not sufficient germ for all bread to contain it. It is interesting to note that the new germ-bread process is an outcome of a more general fundamental study of flour quality.

The lecture was illustrated with diagrams and with samples of breads. The supper afterwards included wheat germ bread.

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The Annual Meeting was held on November 6th. An "Odds and Ends" evening followed, at which various members passed on useful tips.

Mr. Dick showed a method of measuring refractive index using only a piece of plate glass, which he had graduated. He used it regularly to find the refractive index, and hence, the sugar content of malt. The results were sufficiently accurate.

Dr. Gardner spoke of the difficulty sometimes encountered of cleaning sintered glass crucibles and said that he had had good results by passing a dilute solution of hydrofluoric acid rapidly through the sintered glass. This removed gelatinous silica, which was sometimes the cause of the trouble.

Mr. James pointed out that the colour change for the indicators brom cresol green and brom thymol blue was the same, so that the discs for these two indicators for use with a comparator were identical except for the graduations. The brom cresol green disc could be used with brom thymol blue simply by adding 2.4 to the readings.

Mr. Perÿman described several simple devices for automatically cutting off the power supply to a still should the

water supply drop below a prearranged amount. He also described a micro method for measuring pH by means of a glass electrode.

Professor Soper showed a filter for obtaining yellow light for polarimetric work. Ordinary electric light was used and the filter was a decimeter tube containing a solution of 8.8g. copper sulphate and 9.4g. potassium dichromate in 200 c.c. water. It was not as good as a sodium lamp, but was good enough for most work.

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Personal.

Professor F. G. Soper was to have been President of the chemistry section at the Conference of the Australian and New Zealand Association for the Advancement of Science in Adelaide, this year, but the Conference had to be cancelled.

Dr. S. N. Slater has recently returned from Oxford, where he gained the degree of D.Phil., after spending two years working under Professor Sir Robert Robinson, F.R.S. His work was directed towards the synthesis of substances related to the sterols He has now commenced duties as Assistant Lecturer at the University of Otago.

Mr. J. A. Cole has left to join the Royal Navy. Jack Cole entered Canterbury University College in 1934 and completed his M.Sc. degree with first class honours in 1937. At the beginning of 1938 he was appointed assistant lecturer in the Chemistry Department, Otago University, which position he held up to the time of his joining the Navy.

His cheerful disposition and unfailing good humour soon won him a large number of friends both inside and outside the University. We wish him the best of luck in his new position, and a safe return to Dunedin.