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EDITORIAL

Recent chemical journals from England give clear indications of a growing shortage of chemists for work of national importance, and publish an appeal from the Ministry of Labour for all chemists, especially young men and women, to put their names on the Central Register of persons with technical, scientific, and professional qualifications. With the intensification of air raids, British industrial plants will take on increasingly the character of a front line of national defence and casualties among the trained personnel will become more frequent. It should once more be stressed to the authorities in New Zealand that in this Institute there are available reinforcements for overseas service in this field and that chemists called up for national service would be best employed in such vital work. New Zealand chemists could be used not only in England, but also in Canada and Australia, since in a long war the rapid building up of industrial production in these countries, largely immune from air attack, may easily become of decisive importance.

THE GENERAL SECRETARY

T. A. GLENDINNING, M.Sc., F.I.C., F.N.Z.I.C.

T. A. Glendinning, Honorary General Secretary of the Institute since 1933, was educated at a Scottish Academy School, and went from there to Leeds University where Arthur Smithells was Professor of Chemistry. At that time Stroud had the chair of Physics and Barr of Engineering. These two men invented the Barr and Stroud range-finder subsequently used in the navy. J. B. Cohen was Professor of Organic Chemistry, and Proctor (the father of Leather Chemistry) was in charge of the Leather Department. Cobb, a fellow student of Glendinning's, later held the chair of Coal and

Fuel. A number of students at that time did not study for a science degree, but took a four year course in Chemistry, with physics and mathematics, intending to become industrial chemists. They sat the A.I.C. examination and subsequently for the Fellowship. From Leeds, Glendinning went as chemist to a large North of England brewery and after two years became an operative brewer, keeping control of the laboratory with the help of assistants From there he went to a blend brewership in Lancashire, and then to the position of chemist to Tennant and Co., the well-known Glasgow brewers.

His first three years in New Zealand were spent free-lancing, at the Waihi goldfields, flax-milling, and other occupations. He then joined the staff of the Wellington Technical College as instructor in science and mathematics. He resigned this position some eighteen months ago, and is now science master at Scots' College.

In 1921 Glendinning took the Master of Science degree in the New Zealand University with second class Honours in Chemistry. He has written text-books in general and food chemistry, and his interests are as wide as the subject itself. Institute members are well aware of the service he has rendered as general secretary. He stands today, prominent among the senior members who have laid the foundations securely upon which the Institute of the future will build.

BRANCH NOTES

Auckland.

The following local members have been elected this year: A. L. Arkinstall, C/o. Kempthorne Prosser Ltd; I. S. Hart, Dominion Laboratory, Auckland; T. H. Wilson, C/o. A. J. Parker, Esq., Consulting Chemist.

The Branch was addressed by Dr. D. Brown of the Physics Department, Auckland University College, on "The Upper Atmosphere."

The speaker said that one might expect certain stratification of the various gases that compose the atmosphere with the lighter gases, hydrogen and helium forming layers above the heavier oxygen and nitrogen. It is found however, that there is only a very slight tendency in this direction. The relative proportion of oxygen to nitrogen seems to be practically constant for all altitudes. Balloons may be sent up to about

35 kilometers to collect samples of air, which can be analysed, but we have to rely on indirect observations for arriving at the composition at higher altitudes. There is only an arbitrary demarcation between our lower altitudes and the stratosphere, but above this at about 60 kilometres there is a definite strata known as the "Ozone Layer." Although the percentage of ozone is not high it is sufficient to absorb many of the wave bands of the Sun's ultra violet and in so doing, becomes heated to a temperature approximately 100deg. C. hotter than the air either above or below it. Life as we know it on this planet could not exist were it not for this layer that removes the greater part of the Sun's ultra violet rays. The evidence for the higher temperature of this layer is partly derived from its ability to reflect back to the earth very powerful sound waves such as the noise of a volcano. It has been recorded that persons 100 miles away hear the sound whereas people 60 miles away do not. This is explained by the fact that the ground wave has died out, and those people at 100 miles distant hear the "echo" reflected back by the high temperature face of the ozone layer.

The aurorae have been subjected to spectroscopic analysis and the evidence shows that there is no hydrogen or helium in any abnormal quantity. Oxygen and nitrogen are still the chief gases present at between 60 and 100 kilometers where aurorae are observed.

Radio produces evidence of two other layers at about 100 to 200 kilometers known as the E and F layers respectively. At 100 kilometers the barometric pressure is 0.001 m.m. and at 200 kilometers is 0.00001m.m. of mercury. The stratification at these altitudes is due to ionisation by specific wave lengths of the ultra violet, of molecular oxygen at the E layer, and to ionisation of atomic oxygen at the F layer, which are their respective regions of greatest concentration.

The evidence for these layers lies in their ability to reflect radio waves back to the earth and to form "echoes." Oscillographic measurements of the lag between the direct or ground wave and the echo wave can be calculated back to show the height of this reflecting strata. There is evidence of two distinct strata as evidenced by two echoes. These are the E and F layers.

From the relative intensity of the ground wave to the echo, the refraction, and hence the ionic collisions per second can be calculated. This enables us to calculate the barometric pressure at the surfaces of refraction. From a variety of evidence the temperature at each altitude can be calculated.

Earlier opinion was that the temperature dropped progressively as one ascended. This is by no means the case. Leaving the surface of the Earth with a mean temperature of 20deg.C. the thermometer drops to a minimum of about -50deg. C. at about 50 kilometers. It rises sharply here at the ozone layer to +50deg.C., and after dropping down again above this layer to -50deg.C. it rises in the region of the F layer at about 200 kilometers, to the surprisingly high temperature of about 900deg.C.

Would-be voyagers to Mars in rocket ships were advised to observe this.

WELLINGTON BRANCH.

W. G. Hughson's Chairman's Address was on "The Physical and Chemical Survey of the Coal Resources of New Zealand."

He prefaced his remarks on the New Zealand survey with a brief description of the English Fuel Research Board, the causes which led to its inauguration and the way in which development had proceeded. The objects of the Survey were set out briefly as follows:—

1. Primarily to obtain and collate fundamental information relating to each seam and to each coal field throughout the country.

2. To conserve nationally the reserves of a valuable raw material. It must be obvious that complete avoidance of waste can only be achieved by first acquiring full knowledge of the materials with which we are dealing.

3. With increasing refinement in machines and with competition from alternative sources of power, increasingly exacting demands are made on coal. Many undertakings now buy their coal to a strict specification so that the work of the survey fulfils a double purpose—it enables the consumer to obtain his exact requirements and the producer to find new and suitable markets.

4. In times of emergency the Government look to the Fuel Research Board for an immediate answer to all fuel problems.

5. A further object of the survey is to select seams of coal suited for special purposes and to advise on their reservation for that purpose. Such procedure is sound policy, both from an economic and from a conservation point of view.

6. With the advance of research and such topics as the effect of swelling of coals on retort walls and with the correla-

tion of laboratory and works practice it is possible from assay information to recommend coals suited especially for the manufacture of metallurgical coke, for the production of gas, or the manufacture of a smokeless domestic fuel.

7. Information regarding impurities in coal is becoming more welcome as specialised metallurgical processes recognise the deleterious or beneficial effects of those elements on their product.

8. The Billingham Plant must be classed as a large-scale experiment founded on fundamental investigations into the hydrogenation of coal and oil. With a knowledge of the characteristics of coals most amenable to hydrogenation the Fuel Research Board is in a position to select the most suitable coal for the process and also to indicate the available reserves and what steps, if any, should be taken to conserve those supplies.

9. A final reason for speeding research into all matters concerning the more scientific use of our coal reserves is found in an examination of the relative lives of the world's supplies of oil and coal. We seem to be faced with the exhaustion of the world's supplies of oil within 100 years; possibly within this century. The life of the coal reserves on the other hand is measured in thousands of years instead of tens. Mr. Hughson said that from every point of view these facts should be emphasised so that adequate steps could be taken to scientifically conserve our coal measures, not by limiting of output but by avoidance of waste. The speaker then outlined the functions of the New Zealand Coal Survey Committee and the way in which the work was divided into Field and Chemical Investigations. The field work consists in surveying, geologising, and mapping in detail not only mines which are now working, but old workings, and all coal bearing areas. In consultation with local mine officials a programme of sampling is arranged to suit each particular area. Samples are taken in accordance with British Standard Specifications and in cases such as this our dependence on the work of the British Standards Institution and the Fuel Research Board serves to emphasise the universal value of their work.

The manner in which run-of-mine samples were taken was demonstrated by reference to charts which took into consideration the "average error" of sampling. The "average error" which is a measure of the heterogeneity of a fuel has been shown to bear a definite relationship to the total ash content. By reference to a seam 48ft 6in thick in the Millerton area it was shown how detailed examination and sectional sampling enabled the investigation of such problems as the distribution of sulphur, ash, etc., in the seam. The samples were enclosed in air-tight containers and forwarded to the Laboratory together with the sampling map of the area and a detailed description of each sample.

The detailed examination of the samples in the Laboratory, having been dealt with in a previous paper were only briefly referred to by the speaker. It was shown how data already produced had made it possible to select coals suitable for the manufacture of metallurgical coke in connection with the proposed Iron and Steel Industry.

Mr. Hughson then went on to indicate by reference to wall-maps the areas of the West Coast which the Survey had already considered. A preliminary survey had been made of the Westport and Blackburn areas but a detailed survey of the Greymouth field was now almost complete and the speaker was able to show how the coal bearing area which covers about 50 square miles was divisible geologically into nine separate blocks each containing a distinct variety of coal. The highly faulted nature of this field is typical of a number of New Zealand's best coal bearing areas and reduces considerably the amount of coal which can be economically won.

An interesting comparison was drawn between 50 square miles of the Greymouth area which might possibly yield 50,000,000 tons of recoverable coal and a seam recently surveyed in England which covers 600 square miles and represents some 3,000 million tons of coal.

At the June meeting Mr. J. L. Mandeno discussed "The Gas Storage of Apples."

The speaker outlined the development of this method of storing apples and traced the research work done in England by the Food Investigation Board since 1918. Gas-storage is now widely applied on a commercial scale in Great Britain.

When placed in an airtight container, apples, by their normal respiration, use up oxygen from air and replace it with carbon dioxide. This fact is made use of in commercial gas-storage, the fruit being placed in a gastight refrigerated store and the carbon dioxide is allowed to accumulate to a definite amount. This amount is maintained by admitting fresh air into the store from time to time. The optimal conditions of storage vary for different varieties of apples and must be determined by careful experiment.

The speaker then went on to describe the small-scale experimental plant and method of carrying out experiments at the Dominion Laboratory. Some coloured slides showed very well some of the results obtained. Apples cool-stored in the ordinary way were yellow and somewhat diseased, while comparable fruit which had been gas-stored was fresh and green. These results are now to be tried out on a larger scale in a semi-commercial plant being erected at the Laboratory. In this new store the results so far obtained will be tried out on 10 ton lots of apples.

Mention was made of the advantages of gas-storage over ordinary cool-storage and some reference was made to the way in which it could fit into the present system of marketing apples in New Zealand.

The latter half of the lecture was devoted to explaining the theoretical aspects of the subject. The life history of an apple was briefly traced and mention was made of the chemical changes that go on.

It was shown how and why the life of an apple is prolonged by lowering its temperature in a cool-store and by allowing carbon dioxide gas to accumulate in the storage atmosphere. The lecturer dealt with some of the diseases of apples which are liable to occur in storage and described the methods adopted to prevent their occurrence.

The lecture was illustrated by diagrams and colour photographs and at the end a film on "The Gas-storage of Fruit" was shown.

In July, Mr. T. H. McCombs, M.P., gave a paper on the subject " Science is Human."

The laws of science," said Mr. McCombs, "are in part the creations of the human mind. The great outcome of the relativity and quantum theories of the new physics is not what they tell us about the properties of curved space-time or about atomic structure. Their chief lesson lies in matters of far greater import to the layman—namely, in the nature of science and the scientist. The outlook and method of science penetrate through our daily lives and even into the unconscious mind.

"That the scientist and his science are in a new sense inseparable is the most significant result of the theory of relativity. The three centuries of the scientific age began with a denial of this idea. The scholastics of the Middle Ages had tried to find the truth by reason and thinking. Copernicus, Galileo, Kepler, Boyle and Newton, discovered a road to knowledge by watching and manipulating things. For three hundred years scientists believed that by observation, experiment and mathematical deduction they had divorced themselves from the frailities of their minds.

"The main vehicle of science is not," said the speaker, "the published accounts of laws and experiments in books and periodicals, but the minds of men. The organisation of society at the time will affect the understanding of those who read."

The speaker then went on to explain that what we call science is a mixture of laws which seem to us to be true because our minds and social structure remain relatively stable during our lifetime. Some science is nearly fool-proof. The equations of motion of a freely moving body, as devised by Galileo, are likely to remain acknowledged whether Marx or Mussolini, Hitler or Churchill, are in the ascendant. At the other extreme the psychiatric diagnosis of a mentally sick person is intimately dependent on the social philosophy of the analyst. He then stressed the importance of the scientist to be able to speak logically and mathematically and also have independence of thought. A talent for original thought can be acquired most readily by long periods of solitude. To obtain the necessary solitude the scientist may shun his fellows or he may have the power of being alone in the midst of a crowd. Either of these produces a man with an abnormal cast of mind. It is not surprising, then, when we see other evidences of strange mentality—some precocious intelligence, or persistent eccentricity. "The person," said Mr. McCombs, "who does something unique with his mind must have unique habits of mind."

He then went on to discuss the general tendencies in scientific thought throughout the ages and showed how, in spite of all attempts to keep strictly to the truth, it was influenced by the customs and preconceived ideas of the particular age. The speaker gave several examples of scientists who, although today they are looked upon as having done outstanding work towards the advancement of scientific truth, had to wait years for their work to be recognised and accepted. An outstanding example mentioned by the speaker was that of Galileo but even today there are many examples of the unwillingness of scientists to recognise new work which apparently contravenes accepted laws.

We are witnessing in the world today a conscious effort on the part of organised society to influence the scientist in his work. The Nazis have redirected the whole meaning of science in their country. In particular they seized on the so-called "immature" sciences—psychology and social sciences and under the guise of research they have co-ordinated them that they prove only those things and find only those facts which would fit into the Nazi philosophy and to the extent that the scientists themselves become imbued with Nazi doctrines and habits of mind their task will become easier to them—easier still perhaps by the knowledge that unconformity will bring dire personal results. The same process is going on too, in Russia, where the workers fit in to the schedule of expansion and those researches not of direct benefit to the plan are at present at least pushed to one side. These two countries are pushing to the limit, consciously, the unconscious process that he had suggested is going on, of society moulding the opinions and decisions of scientists. There is no doubt whatever, that the leaders of science in any period are men of sympathy with the ruling classes of that period and voicing their interests and ideals.

CANTERBURY BRANCH.

The April and May meetings were addressed by L. W. Ruddle, the topics being "Alkaloids" and "Fixed Oils." The following extract from the first lecture will be of general interest.

"Apomorphine in the form of hydrochloride is a most powerful antidote for strychnine. During the last seventeen or eighteen years I have had considerable experience with this in strychnine poisoning of dogs. Many hundreds of reports are available about Canterbury on its success in these cases. Contrary to general beliefs, it is also on record here that both horses and cows have been saved with it.

"It came as a surprise then, to find a statement abstracted from a Viennese paper to a Paris paper and eventually to a Pharmaceutical paper in England, that it had been proved of no value at all.

"Haggard and Greenberg state that it is successful with twice the lethal dose of strychnine in man or dog, but not with thrice. In one case a child had recovered from 1/10 grain and an adult from 1/5 grain. The medicinal dose is given as

1/32 - 1/8 grain of the hydrochloride for adults. D. & H. Gold denied this and said that apomorphine does not prevent death in dogs poisoned with strychnine.

"Kempf McCallum and Zerfas instance two recoveries (one from 1/2 grain and one from 13½ grains) by injections of sodium amytal and state that apomorphine may prove dangerous.

"Various others boost sodium amytal with no mention of apomorphine, but why the rush into print to boost a proprietary drug, good as it may be, against a well proven antidote such as apomorphine. It seems, from the welter of information available that a dog may be saved when almost at its last gasp—by an injection of apomorphine.

"In an examination of mucus from a horse's mouth a year or two ago, I isolated a very small quantity of strychnine, sufficient to give a positive with Mandelin's Reagent. As the strychnine may have been given as a solution of one of its salts, or as Tincture of Nux Vomica, or as extract or powdered Nux Vomica, I applied the Nitric Acid test for Brucine but obtained no reaction. As it seemed most probable that the dose had been given by means of the tincture, I diluted tincture of Nux Vomica very considerably and found that the Mandelin's reaction picked strychnine at a dilution that no longer gave the reaction for Brucine."

A short survey was made of the principal alkaloids of each of the eleven groups as defined by T. A. Henry, their botanical origin, pharmacological and therapeutic actions and extraction and identification of the more commonly met ones.

A talk of considerable interest, in view of the desirability of establishing, if possible, an iron and steel industry in New Zealand, was given by Mr. J. Hutton. A very comprehensive survey of the various processes used and the types of steel produced in modern plant was made.

Discussion centred around specifically New Zealand problems, such as the utilisation of scrap, the possibilities of Onekaka, and the problems of small scale production.

Another talk related to New Zealand industry was given by Mr. A. F. Adams on "Ceramics."

New Zealand is only moderately well supplied with raw materials for the manufacture of ceramic products, the nature and occurence of some of these being as follows:—

China Clay.—No extensive deposits of primary clay are known in New Zealand, but deposits of high quality sedimentary clays are frequent in the Whangarei district. There is also a deposit near New Plymouth. In general, these have a higher iron and quartz content, and are more plastic than true china clay. They might almost, in fact, be included in the category of ball clays.

Pottery Clays.—Clays suitable for the production of stoneware and general pottery are found in numerous districts, notably Whangarei, Tadmor (Nelson), Huntly and Wyndham. Other similar clays of somewhat lower quality, but still quite useful are found at Reefton, Waimangaroa, Balfour, Waikaia, Clinton and various other places.

Fireclays.—These differ from the clays included under china clays (which are also refractory) in that they contain considerable amounts of quartz. Clays of this type are found chiefly in the coalfield areas; *e.g.* Waikato, Whangarei, Brunner and Mount Somers. The fireclays from Reefton and Greymouth are unusual in that although containing considerable amounts of alkalis, they are quite refractory, since the alkalis are present as mica, and not as the more readily fusible feldspars.

Feldspar.—Potash feldspar occurs native at Charleston, and a feldspathic rock is found at Portobello (Dunedin). A deposit of decomposed granite near Nelson, when washed, gives a clay containing a high percentage of feldspars. These materials, used separately or mixed, could probably replace imported feldspar and cornish stone.

Flint.—High grade flint has been found at Hikurangi and Marlborough. If in insufficient quantity, use could be made of the silica sands available at Mount Somers, Silverdale and Takaka.

At the July meeting, a welcome was extended to Dr. H. C. Holland, who has returned after two years in England. He commenced work at Leeds University in the Leather Industries Department of the Faculty of Technology in October, 1938, under Professor D. McCandlish and also in the Textiles Dept., under Professor Speakman and Dr. Astbury. In May, 1939 he was elected to the Proctor Memorial Fellowship at Leeds, becoming the second holder of the Fellowship which was open to competitors from all countries and which was founded by international subscription in memory of the late Professor H. R. Proctor, F.R.S. A thesis entitled "The Chromium Salts of Organic Acids in relation to Chrome Tanning'' was presented to the Leeds University authorities in April for the degree of Ph.D. which was conferred in June. During his stay in England he spent some time at the laboratories of the British Leather Research Assn., British Boot and Shoe Research Assn., and the Wool Industries Research Assn., and also at some of the I.C.I. factories, and many other industrial plants. Dr. Holland is now Assistant Works Manager at the Woolston Tanneries

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OTAGO BRANCH.

On June 5th, Mr. H. L. Longbottom gave a very interesting account of some of his experiences in munitions work during the last war. He pointed out that at that time Britain had not the chemical industry nor the trained chemists as at present. Applications were invited from the Empire for chemists, and over 100 Australian chemists were working at the explosives factory at Gretna. The object of the factories built then, besides the supply of munitions, was to build up a chemical industry and a chemical engineering staff for Britain. British chemical industry had made wonderful strides since then, and would be an important factor in this war.

Until 1915 Britain had imported cordite from the U.S.A. The factory at Gretna was built in about six months despite the fact that it was 9 miles from end to end, and it cost £18,000,000. The staff of 20,000 was provided with hostels, churches, schools, shops, picture-halls, etc. It produced on the average 800 tons per month of explosives for the army and navy at a saving of £1,600,000. The lead tanks were made in Melbourne because of the shortage of lead and of lead-burners in England. Great precautions were taken to minimise the risk of fires or explosions. Workers in ''danger-buildings'' were searched by special police men and women for matches or other dangerous articles. They were not allowed to wear buttons on their clothes or rings because of the danger of friction causing an explosion. Special shoes had to be put on. Trained rescue squads were always ready.

Glycerine was purified at the factory. Nitric Acid was made from Chili Saltpetre. A Mannheim plant was originally built to make sulphuric acid, but this was soon replaced by a Grillo plant which was so much cheaper to run that the cost of replacement was justified. The lecturer said it was generally believed that the alcohol used came from Jamaica rum, the barrels being very carefully guarded. Much of this was converted into ether. Raw cotton was packed into a mixture of sulphuric and nitric acids, and the gun-cotton formed washed, disintegrated, and dried in small lots. The nitration of glycerine had to be carefully controlled to prevent the temperature rising above 10deg.C. The nitroglycerine produced was mixed with gun-cotton and with alcohol and ether, and, after kneading with vaseline, the mixture was forced through dies. The alcohol and ether were driven off by heat and recovered by cresol in towers. Part of the spent acids was revivified by adding more acid, and part was heated to drive off nitric acid, which was collected, and the remaining sulphuric acid was concentrated.

Mr. Longbottom briefly referred to the manufacture of mustard gas at another works. He said that it was a record for a member of the staff to remain on duty for a fortnight, and many took months to recuperate. In 1918 all the staff was indisposed from the effects of the gas or from influenza, and there was a call for volunteers. The reaction used was $2C_2H_4 + S_2Cl_2 = (CH_2Cl\,CH_2)_2\ S + S$. The ethylene was made by passing alcohol vapour through syrupy phosphoric acid. The mustard gas produced was used in September, 1918, in the attack on the Hindenburg line, and was thought to have been a factor in the success of that operation.

On July 10th, Professor F. G. Soper gave a very able survey of the uses to which isotopes have been put in studying the mechanism of reactions and other problems.

It has been known for about 30 years that certain elements, of which lead and bismuth are examples, exist both as stable and as radio-active forms. It is therefore possible, by mixing one of the radio-active forms of lead (e.g. RaD or Hh.B) with ordinary lead, to label these lead atoms and render them easy of detection, without in any way affecting their chemical properties. This use of radio-active indicators was realised by Hevesy and by Paneth who in pioneering investigations just preceding and following the war of 1914-1918, used radio-active lead to measure the solubility of sparingly soluble lead salts, to demonstrate the interchange of radio-active lead atoms between the sparingly soluble lead chloride and lead nitrate in solution, but not between lead chloride and the co-valent lead tetraphenyl, and to follow the assimilation and distribution of lead in the broad bean and the absorption and excretion of lead and of bismuth in the animal body. These three investigations exemplify the three main uses to which isotopic indicators have been put, namely:—

(a) a means of estimation of a particular element or its compounds, otherwise difficult to separate and/or estimate.

(b) demonstration of the interchange of an atom in one molecule with an atom of the same element in another molecule.

(c) elucidation of the place and sequence of biochemical changes.

With the concentration of the natural non-radio-active isotopes of hydrogen, oxygen and nitrogen in 1933 and 1934, the use of isotopic indicators was much extended. Hydrogen-deuterium exchange in the deuteration of benzene by heavy sulphuric acid, shows that the substitution of hydrogen by deuterium is influenced by the same factors that influence chlorination or nitration. In contrast to the relatively easy exchange of hydrogens in benzene, is the non exchange of hydrogen in the hypophosphites showing that the hypophosphite ion, H_2PO_2, does not ionise further into hydrogen ions. Hydrogen-deuterium exchange, during adsorption on nickel has led to a considerable clarification of the adsorption process. Use of the heavy oxygen isotope in water shows that in the hydrolysis of esters, unlike salt hydrolysis, fission occurs into acyl and alkoxy fragments, whilst in esterification, again unlike salt formation, the hydroxyl group of the acid is eliminated with the hydrogen of the alcohol.

The bombardment of the atoms of light elements by artificially accelerated protons in 1932 and later by the nuclei of heavy hydrogen, coupled with the discovery of neutrons in 1933, and their use as missiles against the heavier elements, has led to the isolation of many radio-active elements formed by nuclear reactions and which are of use as radio-active phosphorus, sulphur, iron, carbon, cobalt, bromine, and iodine. These, together with deuterium and heavy nitrogen, are of great use in following biochemical changes. Radio sulphur, for example, of half life 88 days has been converted into methionine and after feeding this to rats the radio sulphur appears in the hair and skin, and may be extracted as cystine. Radio sulphur fed as sulphate does not appear to be converted into cystine.

ANNUAL CONFERENCE, 1941.

The Council has accepted the invitation of the Otago Branch to hold the next Conference in Dunedin. It will be held at the end of January—details will be announced later.

CORRESPONDENCE.

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

Membership Qualifications and Status of Chemists.

This matter is indeed not simple of solution in our country. We need a strong, vigorous Institute and it will function in that manner just so long as we develop along the right lines. The position at present is that we have a heterogeneous collection of chemists, small in numbers, representing many diversified branches of chemistry, viz:—Public service, dairy and primary, research, teaching, industrial and applied, analytical etc. The academic qualifications of our members are varied, and the opportunity for some non members to reach a desired academic standard for admittance through inaccessibility to schools is indeed a problem. Salaries paid to scientific workers are far too low compared with those of other countries, and this becomes accentuated when relative cost of education and cost of living is taken into consideration. Mr. H. Harvey's illuminating salary chart of Australian Institute members' rates clearly shows how we stand by comparison. It is not my intention to suggest that our Institute becomes a trade union functioning body, but at the same time, it is of vital importance to our status and the vitality and success of our Institute that salaries become commensurate with educational training and qualifications and comparable with other professions requiring no more costly or exacting preparation. We should compare our profession, as of a similar educational status, to the lawyer or accountant and salaries should be comparable, instead of which we find them so frequently below those of clerks, shop assistants, and yes, I believe someone said, waterside workers. Would it not be possible for us to find out from the English and Australian Institutes in what manner they approach the matter of fixing minimum basic rates of pay for qualified chemists and members in their countries. It is true that secondary industries are young in New Zealand, but New Zealand is young too, and doctors, dentists, etc., are able to command a standard of remuneration of a very satisfactory nature, and so can tradesmen and slaughtermen.

Having laboured this point my object is to focus attention on the principal flaw in our worthy profession. It is our duty as chemists and as an Institute to make the status of chemistry financially as well as academically of a sufficiently high standard. To those of your correspondents who discuss the advisability of lowering the academic standard, I would offer a few suggestions. It appears that some educationalists are strongly behind examination removal in schools. It is a very moot point whether this is in the best interests of a community. Unless something of proved and equal merit is immediately substituted for set examinations, then it is unlikely that mental effort will be made. The Public Service recognises this, since they now insist on departmental examinations, as the means of determining merit for promotion and salary increases.

I have had a quarter of a century's experience as an executive chemist in industry in country districts of New Zealand. During this time, many juniors of Matriculation and higher standard have been in our laboratories. Their problem has always been the same, how to get further and suitable academic training. Some have taken the School of Mines Examination, and others correspondence courses, and I believe the latter have much to commend them for those in districts away from colleges. Students should, however, make sure they study with a view to passing an acknowledged examination. The Institute of Chemical Engineers (England) is one that maintains an exceptionally high academic standard. The subject of Chemical Engineering is probably the one most suited of any for the industrial chemist and the associateship examination can be supervised (I believe) in New Zealand Universities by special arrangement following training, specially set for this examination by correspondence schools soundly recommended. When facilities such as these are available it should be possible for chemists in New Zealand wishing to qualify for entrance to our Institute, to overcome any present academic deficiency and in their spare time. This should clarify the point raised by the President when he speaks of the need for "industrialists with a knowledge of chemistry." The reply to this need in other countries is the Chemical Engineering degree, which prepares the necessary background and training for the building and operation of any chemical industry. The basic principles of Chemistry and Engineering must both be thoroughly understood, and a sufficiency of business methods and economics is included to enable a student to manage quite successfully the particular industry in which he is specialising.

In conclusion, I wish to thank the executive for the valuable work they have done and are doing and trust my remarks will prove helpful to those affected.

E. LEESE,
North Auckland. M.I. Chem. Eng. F.N.Z.I.C.