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SCIENCE AND THE SCIENTIFIC WORKER

An address by His Royal Highness the Duke of Edinburgh to a gathering of New Zealand scientists at the Dominion Museum, Wellington, on 13th January, 1954.

When the arrangements for our tour in New Zealand were first under discussion, I had just been appointed President of the British Association for the Advancement of Science, and for that reason I asked to meet representative scientific workers here so that I could hear at first hand some of the scientific problems under investigation in New Zealand and also learn something of the scientific atmosphere. I made this request because I am convinced that the proper development and security of any country depends to a very large extent upon a high level of technology and scientific activity.

Somehow this idea of mine has led to the suggestion that I should address you at this meeting, and, while I do so willingly, you cannot expect me, after such a short time, to be able to discuss your scientific problems with you as intelligently as I would wish and as you might perhaps hope.

As President of the British Association, I had originally intended to bring you fraternal greetings from the scientists of the United Kingdom. As you know, I no longer hold that position, but I am delighted to tell you that Dr. Adrian, Master of Trinity College, Cambridge, who this year combines the Presidency of the British Association with that of the Royal Society, has asked me to bring their greetings and good wishes to the Royal Society of New Zealand and to the scientists assembled here in Wellington today.

I daresay that when this tour is over, I shall have a chance to collect my impressions and form some conclusions, but there is one thing which seems quite clear to me already. I have always pictured science as man's struggle with Nature to discover her secrets, Nature has been, so to speak, the scientists' adversary, reluctant to part with her mysteries. But here in New Zealand the picture seems to me to be entirely different. My impression is that Nature and science are working in a happy partnership. This may be because the prin-

cial efforts of scientists in New Zealand have been in the field of agriculture in its broadest sense. Indeed, New Zealand has produced many distinguished men whose work has been devoted to agricultural science.

Most of these men are fortunately still alive and contributing to our store of agricultural knowledge and to the advancement of New Zealand's already outstandingly efficient agriculture. It would be invidious to select a few names from amongst so many. Their skill has used the wonderful climate of New Zealand and her potentially fruitful soils to provide one of the most, if not the most, economic systems for the production of meat and dairy products in the world. But the soil was not always fruitful before the studies of the soil chemists showed the need for trace elements. The dairy industry could not have been what it is today without the remarkable work of the bacteriologists. The study of the breeding and nutrition of livestock has raised the quality of sheep and cattle to its present high level. But so well known is New Zealand for her meat, butter, and cheese, that we are apt to forget that scientists have also made possible the successful cultivation of fruit and tobacco and have bred new varieties of grasses and cereals to suit New Zealand's conditions.

One name, however, I think I must mention, for he was probably the most distinguished pioneer of much of this work—the late Dr. Cockayne. New Zealand owes him a very great debt, and in mentioning his name I would like to pay my tribute to all those who have followed him.

Quite apart from the agricultural sciences, there is no doubt whatever that New Zealand has pulled her full weight in scientific development within the limits of her resources, whether it be the care of children or the study of diseases such as goitre, or the close study of Polynesian migrations. The reputation of her scientists, both those who have left these shores and those who are working here, stands high in Britain and in other countries.

The material achievements of scientific work in the past half-century have been so remarkable that they may have led to claims verging on the extravagant, but, as Sir Edward Appleton has pointed out, we must avoid at all costs the disagreeable consequence of putting the scientist on a pedestal, for all true scientists are humble in the face of their knowledge.

The advances in basic knowledge between the great wars was prodigious, and, since the end of the last war, the pace has accelerated still more and still there is no finality in sight. New knowledge is being obtained at such a rate that one man cannot keep

abreast by even reading the abstracts of papers in one of the traditional branches of science. Subdivision and specialization are inevitable. Even so, the interest of the individual scientist need not be lessened by this specialization. There is still the pleasure of attempting to explore and to understand and to pass on to fellow-workers.

In an ideal world, each scientist in his search for fundamentals builds on the work of his predecessors and colleagues, irrespective of racial or national boundaries, and we must keep this ideal in sight, even if it is not fully with us.

It is perhaps a different story when this common, fundamental scientific knowledge is applied to industrial or national purposes. The field of applied science enters into questions of relative industrial development or into defence in which questions of national or group security arise. The matter is further complicated because the cost of apparatus, instruments, and facilities have become enormous, as it has become more and more removed from the common facilities required in everyday life. The string and sealing-wax and simple flask days of research in the physical and chemical sciences, for instance, are over.

Rutherford in his day could operate the material requirements of his band of research workers on less than £1,500 a year in terms of present-day money, whereas nowadays work in his field needs machines and atomic piles which cost as much as a small battleship and, relatively, this is the position in all branches of science.

The day of the private adventurer in science is over. Even the universities cannot meet the demands of their science faculties; and it is the universities who train the nation's future scientists. It has become a national problem, and if the nation needs top-class scientists, it must help the universities to train them, which means, of course, that the money must come in the main from the taxpayer. Yet pure science can promise no definite returns in a given time, while political interference or official lay direction can do much more harm than good. However, by and large, the public understands that it is a necessary investment, and, on the whole, I think it is sympathetic. As regards industry, particularly its larger units, the problem is rather to find enough sufficiently good men and women for the work. But, as regards science for national purposes, health, agriculture, transport, nationalized undertakings, and defence, the public can only be expected through its Government to provide funds, if it can be persuaded that science for itself is a good thing, that scientists as a whole and their leaders are worthy, and that science has a direct influence on its conditions of living and working.

Scientists, on the other hand, need conditions of work peculiar to their avocation—freedom to think and work in their own way, freedom from unreasonable restrictions and regulations—an atmosphere in which they can enjoy their work, and earn the just reward of achievement, particularly in the eyes of their colleagues and the universities. To obtain these conditions, our scientific societies must be careful of their standards and the leaders they elect, or those whom they honour with their distinctions. For their part, scientists as a whole must help the public to understand by making science and scientific method intelligible to them, without making use of sensational publicity or cynical, fault-finding criticism. The public is perhaps a little afraid of science and scientists, so you must lead the public, not try to drive or bludgeon them. The man in the street, I think, appreciates from the successful methods in the war and from the example of scientifically enlightened countries that science is necessary. But it is up to you to show that the necessity is not a medicine but rather a tonic, a means of building happy and secure conditions in his home and country.'

No country can keep pace with scientific development by sitting back and waiting for the fruits of scientific research to be delivered to her on a plate. New Zealand must, herself, take some part in the search for new knowledge to be able to understand, appreciate, and apply that which is developed elsewhere. Whether it be in pure science or as applied to agriculture, industry, or defence, your own efforts are best applied to the problems near at hand.

Each country is dependent on all others for contributions to fundamental knowledge which assist in the solving of its own problems, and it only needs a high enough local level of scientific thought to take reasonably full advantage of the work of others. While the D.S.I.R. can be relied on to take care of all branches of science which have a particular local importance, it remains for the universities to maintain a sufficiently high level of scientific thought in all other branches.

You may think this is asking too much of a small country. You may point out that the best of your scientific brains are tempted overseas by the intellectual attraction of the larger world. From Rutherford and Mellor, down through many lesser but still distinguished lights, you may be tempted to say that New Zealand receives little but reflected glory. In the long run that is not so. The fruits of their work are already returning to New Zealand in the applications of their discoveries and in the respect which New Zealand and New Zealanders enjoy, especially throughout the

English-speaking world. If you create the right conditions, you may look to see in New Zealand growing centres of original scientific work of which you will be proud.

In applied research, however, particularly for military purposes, there is less free flow of information, while the effort involved is, in general, more expensive.

In this field, I believe that it would be an enormous advantage if the countries of the Commonwealth could pool their resources. Modern warfare depends more and more on scientific equipment and trained men to operate it. There are not enough workers in any one country of the Commonwealth to provide all the up-to-date equipment necessary to ensure that each unit is properly prepared for war.

It is good for morale if the Services know that they all have the best equipment available. The provision of such equipment depends on the scientific level of industry in our Commonwealth which again depends on the resources of high-grade technical manpower. Any effort to make the best use of this man-power must surely lead to the common good. But as in every other branch of science you must have defence scientists who can understand and appreciate the work being done elsewhere. Pooling of resources does not mean that all military research and development can safely be left to somebody else, however great a saving that may be.

I have been most interested to hear about the wise, far-sighted experiment involved in the creation of your Defence Science Corps. Trained scientists and engineers who understand the problems of the Services are just as valuable as Service chiefs who understand the capabilities and limitations of scientists.

It is not only scientists who can make a contribution to science. Almost as much can be done by men in authority, in industry, in the Services, in politics, or in administration who have a scientific outlook. These men can help because they make the openings, they can authorize research and encourage its application, and also because their faith in the scientist can be his greatest inspiration.

Finally, of course, there remains, particularly for you in New Zealand, the all-important question—is it all worth it? Does all this effort and money pay any dividends? I think the answer is contained in last year's presidential address to the Royal Society of New Zealand, which is a most comprehensive and instructive review of the application of research here in New Zealand. I would like to remind you of the concluding paragraphs:

"Such is the tempo of the times that it is easy to forget the significance of achievements of a few years past. They easily become accepted as a matter of course, the anxiety and worry they occasioned, as well as the effort demanded for their solution, being easily forgotten."

And again: "The review . . . reveals that New Zealand industry has shown a readiness to adopt scientific advances and to use them in ways which promote our national prosperity, which to an increasing extent must depend on the assistance which scientific effort must supply.

"Finally, there exists abundant evidence that where applied intelligently the results of scientific effort pay very handsome dividends, whether in Government Departments or in New Zealand industries."

Yes, science pays all right, but there is more to it than that. For the future prosperity of the nation, it is essential that everyone should realize that the essence of science is a way of thinking, an adventure of the mind, and a deed of partnership with Nature.

Arthur Oliver, who retired from the position of Assistant General Secretary last year, has resigned from the Dominion Laboratory to take up an appointment as Chief Chemist to New Zealand Breweries with the responsibility of establishing laboratory control in one of our biggest brewery organisations which has up till now considered brewing to be an art not subject to scientific control. We all wish Arthur the best of luck and plenty of co-operation in his approach to the art of brewing.

Mr. L. H. James, Assistant Director, Dominion Laboratory, attended the recent meeting of the A.N.Z.A.A.S. at Canberra. He reports that among other material there was an excellent discussion on Food Additives. Professor Llewellyn, Auckland University College, was also amongst the New Zealanders present.

Although we are publishing the address given by the Duke of Edinburgh in this issue of the Journal as a permanent record for all our members to keep you are recommended to purchase a copy of "New Zealand Science Review," 12th January, 1954, entitled "Royalty and Science" for it contains a wealth of information on the Royal patronage of science and has been excellently produced.

RESEARCH CHEMIST OR PHYSICAL CHEMIST

The N.Z. Pottery & Ceramics Research Association is appointing an Additional Research Chemist. This co-operative research Association serves a group of over 30 factories producing a wide range of clay products from domestic pottery and artware to bricks and pipes. The laboratories are at Gracefield, Lower Hutt. The salary scales are £560-£860 p.a. for a Scientific Officer, and £860-£1260 p.a. for a Senior Scientific Officer. Other conditions are similar to those in the Government scientific service. Complete details will be supplied upon request to the Director, P.A.C.R.A., D.P.L. Private Bag, Lower Hutt.

Closing date for applications: 30th April, 1954.

CHEMISTRY AND FOOD PRODUCTION.

R. E. R. GRIMMETT, *Soil Research Station, Rukuhia.*
Chairman's address to Waikato Branch, October, 1953.

In his presidential address to the 1951 Institute of Chemistry Conference, Mr. P. R. Parr, took as his subject "Food and the Chemist." Some easing of the food situation in Europe and particularly in Britain may since have taken place, but the problem of equating food production both in quantity and quality to the world population is for long likely to be the outstanding issue of this age.

Mr. Parr gave an excellent historical review of the subject and indicated many avenues in which the chemist has played and is playing a prominent part in food production and processing.

My object and excuse for again traversing some of the same ground is to focus attention on the future and to hazard a few guesses as to where and how the chemist may hope to make major contributions to still further increasing food production and utilisation.

There are three major ways in which chemistry contributes to food production.

(1) By providing or ensuring the availability of chemical factors essential for their full development in the environment of plants or animals, or by removing unfavourable chemical factors.

(2) By protecting the growing plant or animal against disease, predators and competitors.

(3) By providing means whereby the raw material of growth as harvested may be made palatable, digestible, of full nutritive value, non-injurious, or suitable for blending or culinary processing as desired.

More briefly these may be described as *Nutrition*, *Protection* and *Utilisation*. Other ways of increasing food production, such as increasing the efficiency of chlorophyll in the overall utilisation of solar energy, or the direct synthesis of food, are possibilities that are unlikely to be of more than academic interest until these three means have been much more fully exploited.

Let us consider the current position, and the potentialities of some examples from these categories so far as New Zealand is concerned.

1. NUTRITION:

That most of our soils are markedly deficient in phosphate, and that our pasture and crop production could scarcely have risen above subsistence level without superphosphate is too well known

to need comment. The indirect gain in nitrogen, and hence protein, from fixation by the legume nodule made possible by this phosphate is perhaps less realised. Under appropriate conditions it may be several fold the quantity and many fold the value of the phosphate applied. Here a question mark may be inserted, however. There is current a somewhat glib assumption that all the phosphate built into the soil by topdressing of pasture land over long periods is still held in reserve, either awaiting means of making it available or at least reducing the need for such heavy applications in the future. A point that appears to have been lost sight of is the possibility of major losses of this "fixed" phosphate by direct removal. We know that most of this phosphate is fixed in the top three inches and even in the top inch of the soil and that it is mostly present in finely divided form, attached to the clay or silt particles. During heavy rain, even in well managed pastures of little slope, the surface run off is usually muddy with this clay or silt which itself is often not a large component of the soil, so that this insensible form of sheet erosion may be removing a considerable proportion of the phosphate fondly assumed to be safely locked up in the soil. Attempts to prepare balance sheets of application, storage and removal of phosphate from fields of long and known topdressing history have so far not been widely made in New Zealand and in the few cases recorded the results have not always appeared explicable. In some cases, as for instance in the technique trials at our own Station, a considerable proportion of the phosphate applied cannot be accounted for even at the end of only a five year period. Recent work in Alabama by Ensminger has shown that in cropped soils of only a few per cent slope, losses in this manner may account for from 30 to 70 per cent. or even more of the phosphate applied during a rotation. It appears to me to be time that we looked more closely at this subject in New Zealand, both by further "balance" studies of fields of known topdressing history on various soil types and by means of measuring and analysing the sediment from sediment traps in run-off experiments. If this loss of stored phosphate is really appreciable in our top-dressed grasslands, added value would attach to the practice of periodical pasture renewal by turning the phosphate-rich top inch or two of soil under a protecting layer of the less enriched sub surface soil. Possible methods of subsurface placement of fertiliser instead of topdressing, as with the "fertiplough" would also be worth considering from this angle, as well as from that of positional availability.

Lime: Liming may be considered an art developed without the aid of chemistry, but to ensure full effectiveness and economy its use is now conditioned at many points by the chemist. Quality of stone is determined by regular analyses and the question

whether a soil needs liming, and if so, how much, is being increasingly assessed by means of the Soil Testing Service.

Potash: Soil and plant analysis is also providing a guide to the use of potash, at one time largely confined to crops and horticulture, but now increasingly required by pasture lands whose original reserve of available Potassium has been depleted by high production over the years.

Minor Elements: It is when we come to the "minor" elements that chemistry seems to assume a more spectacular role. Minor element deficiencies are widespread in New Zealand. The case of cobalt and Bush Sickness is well known to all of you. The point will bear stressing, however, that the removal of this restriction to land development and utilisation for dairying or sheep grazing has long since paid off the cost of all agricultural research so far undertaken in New Zealand.

Boron deficiency is liable to cause trouble to home gardeners as well as farmers in most parts of the country, especially in crops of brassicas and other root and stem vegetables. Applications of borax or borated superphosphate can make all the difference both to growth and palatability. Copper deficiency and its association (together with molybdenum excess) with peat scours, or with imperfect development of onion crops on otherwise rich peaty soils has been well explored and remedied. Magnesium deficiency in glasshouse tomatoes, manganese deficiency in fruit trees, zinc deficiency in fruit trees and exotic conifer plantations, have also been shown to be important, if more limited in extent. Possible excesses still under investigation include manganese and aluminium.

Only recently defined, but potentially as important, if not more so than the foregoing, are the effects of actual or contingent deficiencies of molybdenum and sulphur. Most illuminating is the case of sulphur, and it shows that chemistry should not be treated in cavalier fashion as a mere hand maiden by Agriculturalists. Once it had been shown that either superphosphate or basic slag enabled high quality pastures to be established and maintained for a number of years on a large variety of soil types, it came to be assumed in agricultural circles of all grades that it was only a matter of supplying phosphate in a suitable condition for this position to be maintained indefinitely. Now it has been shown that in some cases sulphur gives a marked response either alone or additively with phosphate. It remains to be determined how far the practice of applying large annual dressings of superphosphate, even when soil phosphate has been built up to a high level, is conditioned by the need for sulphur. Sulphate like nitrate is readily

lost from the soil by leaching, and periodical application of gypsum, the cheapest form of sulphur, may be necessary where phosphatic fertilizers like rock phosphate, basic slag or fused phosphate containing no sulphur are continuously used in place of superphosphate. On the other hand gypsum or sulphur applications may themselves reduce the need for continued large dressings of superphosphate in certain areas. Thus the future seems to lie in the direction of the more rational use of phosphorus and sulphur as plant nutrients, not just empirically as superphosphate, but in the form of combination most suited to the particular case, as shown by soil analysis or field test.

Molybdenum as a nutritive element has something of the qualities of the Philosopher's Stone. It is also a Jekyll and Hyde. It appears certain that its use will have revolutionary effects upon some aspects of our agricultural economy. The conversion of huge tracts of poor browntop and danthonia pastures to good clover-based ryegrass or mixed pastures, and greatly increased response from aerial phosphate topdressing in hill country that would otherwise require prohibitive dressings of lime, are amongst its attractive immediate possibilities. Injurious effects on livestock through indiscriminate use could result from the other side of its character. When as little as $\frac{1}{8}$ oz. per acre can promote a vigorous growth of clover, its kinship with the Philosopher's Stone is apparent.

In such company it does not appear silly to ask if there are elements with effects in Nutrition still unknown because of the extremely minute amounts in which they are required and the extreme difficulty of providing nutrient media free from their last traces, if such a condition is even theoretically possible.

These two conditions would appear from a practical aspect to cancel one another, yet with increasing exploitation of the land and technological control in industry it may not always remain so.

Here is a challenge to the chemist not only of to-day, but of to-morrow and of many days to come.

Turning to the negative side of this aspect of plant nutrition, that is the amelioration of unfavourable environmental conditions, apart from the physical effects of liming due to colloid flocculation, and the removal of excess hydrogen ions or acidity, chemistry has in the past taken second place to the art of Husbandry and the more recent development of agricultural engineering. Cultivation, draining, irrigation, crop rotation, composting owe no great allegiance to the chemist.

But suddenly he has broken into this old world of empiricism with new ideas, new substances and the promise of new and revo-

lutionary procedures. Synthetic gums like Kriliium bid fair to influence strongly, or supplant many of these existing practices.

More speculative at present are the claims that certain synthetic hormones, antibiotics and vitamins by application to the soil or direct to the crop can increase growth or yield at harvest.

2. PROTECTION:

Turning to the second aspect of chemical aids to production, that is plant and animal protection, this is now such a vast and specialised field and one in which I can claim only a layman's knowledge that I shall do no more than enumerate a few of the categories into which it may be divided.

Under plant protection one may consider fungicides, bactericides, insecticides, which may be inorganic, organic or biologically produced chemicals (antibiotics, plant toxins), but tending more and more to synthetic production. They may also be grouped according as to whether they kill by direct contact or systemically through the roots.

Another class of plant protectant is the selective herbicides, used for removing or reducing weed competition. These have shown astonishing development in the past five years and are now the basis of multi-million pound chemical industries in Britain and the United States.

Animal protection shows a similar range of modes of action and of chemical industries, but with shifts in relative importance: for example antisera and vaccines (biological in origin but with a chemical basis, and increasingly conditioned by chemical controls) are extensively used in animal husbandry, but only the first tentative steps have yet been taken with their use in plants; while the use of poisoned baits of selective animal toxicity, for example, in rat control, may be considered a relatively slight analogue of the use of selective weedkillers for plants.

Protective chemistry is fast reaching the point where the chief consideration of this aspect of production is not so much the possibility of providing substances capable of any desired action, as of the economics of so doing. Consequently mass methods of manufacture, and other ways of cheapening these substances such as simplifying steps in synthesis, or finding cheaper alternative raw materials are continually under review by industrial chemists. These are among the few commodities whose prices have tended to fall rather than rise during the past few years.

3. UTILISATION:

The third way in which chemistry aids food production is the one whose exploitation is perhaps the most contentious, and des-

pite having a longer history than the others is still the least developed. Food processing at present leans heavily on biology, physics and engineering. In each of these, chemistry plays important parts, but as a primary means of conditioning food it is still largely concerned with processes that have a traditional or empirical basis. True, there are notable exceptions such as the fortification of foods of unbalanced composition with the appropriate factors such as vitamins, minerals or proteins, the production of glucose from wood, or the use of sulphuric acid in the preparation of silage. In general, however, chemistry has so far been concerned mainly with improving the appearance, flavour or keeping qualities of traditional foods for human consumption, and with only a slightly less restricted appreciation of its possible role in the case of foods for domestic animals.

The total number of plant species exploited by man either as direct food for human consumption or indirectly as food for domestic animals is an infinitesimal fraction of the total described by botanists. Even of those exploited, the majority have only a portion used directly for human food.

The reason why this vast reservoir of potential human food is unutilised falls into several categories:

Mechanical: Toughness or hardness making it beyond the capacity of human mastication, or the presence of spines, spicules or other physically injurious components.

Chemical: The presence of toxic, unpalatable or indigestible compounds.

Traditional: Many potential foods are neglected by the majority from prejudice, ignorance or mistaken identity. Examples are to be found among fungi, and leaves, roots and flowers of many weeds, ornamentals and wild plants.

Distributional: Some food products, overabundant in some localities, may be too perishable for transport to more populated areas, some may be too scattered, and some too erratic in time of occurrence to be worth collecting.

Some help in solving the problems of the last two categories may be given by the chemist. For example by analysis he can determine the composition and potential nutritive value of the raw materials, and he can find or suggest ways of utilising or preserving temporary flushes of perishable foods. But it is in the first two categories that the chemist has a major opportunity of increasing human food by processing biological products at present unutilised, or utilised only in a highly indirect or inefficient manner.

Let us consider our two main plant raw materials in New Zealand—grass and trees.

Of trees in the sense of our native forests and the possible ways in which we might have utilised them, we can only hang our heads in shame—no vision of their possible value in a future of advancing technology or of aesthetic or social values illumined their passing. But in our exotic plantations there is not only timber and wood pulp for the majority of our own and Australia's needs, but also a similar amount of pine needles or leaf material which is either left to rot or burnt to clear.

The content of protein in this leafage is only about 10 per cent. of the dry matter and there is too much turpentine and resinous substance for it to be suitable directly as stock food. However, by removal of these aromatic substances by steam distillation followed by softening with dilute caustic soda or similar treatment, it should be possible to prepare a residual meal of sufficient palatability and digestibility to be used as a stock food. Some pine oils should be recoverable and help to pay for the processing. Under present economic conditions this suggestion doubtless will have little appeal, but in the long run, economics aside, we shall probably have to turn to such neglected but potentially great sources of food. The annual production of leaf from our 600,000 acres of exotic pine plantations would not be less than 600,000 tons of dry matter. Assuming that the trees carry three years' growth of needles when harvested on a 30-year rotation, this would give an annual yield of 60,000 tons of dry leaf. If the treated material had a feeding value equal to hay and assuming an average figure of two tons of hay per acre, this would therefore be equivalent to an annual hay crop from 30,000 acres.

The second and greatest raw material product is "grass." Grass (and clover) pastures in New Zealand vary all the way from the coarse unnutritious tussocks with only a few per cent protein in the dry matter and suitable only for subsistence grazing of dry stock with capacity to digest fibre, to the green leafy young pastures of dairy farms with up to 40 per cent protein in the dry matter and capable of supplying directly a considerable proportion of the food requirements of poor digesters of fibre like pigs and poultry. Even humans could, if they would, take a leaf or two out of the pig's book and be all the better for it. But the high fibre content, and unsuitable physical condition of even the best grass, for culinary processing would still severely restrict its direct use for human food. It is here that the chemist has almost limitless opportunity. Dr. Pirie of Rothamsted has already taken the first steps in work on the extraction of leaf protein. He has devised a

pilot scale mill which efficiently breaks up the cells and separates the liquid contents, containing most of the protein, from the fibre. Protein is separated from the filtered liquid by coagulation induced by heating to 60deg. C. If desired, the coagulated protein may be further purified from fats, starch, pigments, etc., by extracting with appropriate solvents. Drying, grinding or pelleting could lead to a variety of culinary uses just as in the case of soya bean meal, or a grass "cheese" might be made with a selection of appropriate microorganisms. According to Pirie the economics of the process, allowing for the use of the (partially) extracted fibre as a stock food of only slightly less value than dried grass, are distinctly attractive. A first cost estimate is 1/6 per lb for the extracted and processed protein.

By this procedure only the surplus protein in young grass pastures would be skimmed off. The residue, together with grazing of unextracted grass, would provide for full requirements of practically as many dairy cows as before.

Let us consider what the possible production of edible protein for human consumption could be along these lines in a dairying district such as Waipa County, taking Hamilton's survey as a basis. Assuming that the 85,000 acres of dairy pastures produced an average of 10,000 lbs dry matter per acre per annum, this would give 400,000 tons of dry grass. Assuming this to contain 20 per cent protein, and that 4 per cent was removed (leaving an average 16 per cent protein fodder for the cows) this would yield 16,000 tons dried extracted protein. This protein would not of course be extracted from all the grass all the year, but only from the flush of spring and early summer growth that at present provides headaches by way of bloat and other troubles and would almost certainly be greatly improved from this point of view by having a considerable proportion of its liquid contents removed.

Considering other dairying districts in addition to Waipa County, a target of 100,000 tons of dried protein would appear attainable without adverse effect on the dairying industry. To me this appears to present an outstanding challenge and opportunity to chemists and to the captains of chemical industry. To a hungry world it could present no small contribution of that most valued of all foodstuffs, a nutritionally well balanced protein.

CHEMISTS, NEW ZEALAND'S PAUPERS.

Those whose task it is to advise students at the University what course to follow are faced with an embarrassing situation when some aspirant enquires if the financial outlook for Chemists is healthy. Is it reasonable, in fact is it proper in the moral sense, for such councillors to recommend that a youth follow a chemical study course when the possible outcome of such action is pecuniary disability for life? How can government and industry obtain the guidance in involved chemical problems, some affecting the very economy of the country, unless the salaries of professional chemists are such as to attract the most brilliant students? Are they adequate at the moment in relation to the wage structure of less skilled workers?

Problems such as these face all who have anything to do with the training and using of chemists and it is natural to turn to the Institute of Chemistry to see what data one can obtain on matters of salary. In 1952 the Salary Committee of N.Z.I.C. published its findings for June-July-August of that year, these figures will be used as a basis for this discussion.

GENERAL METHOD OF APPROACH.

In these days of relatively unstable prices and salaries, it is of little value to compare salaries of one year with those of an earlier or later period. For the purposes of internal comparison, one group with another, one class of worker with another, a simple device can be used with effect. If sufficient data are available for a given date the salary of members of the group divided into age sections can be translated into a salary/age plot, which can be used to determine salary expectations, total salary etc., for a hypothetical member who as it were rushes through his life as fast as the reader runs his finger along the age axis of the graph.

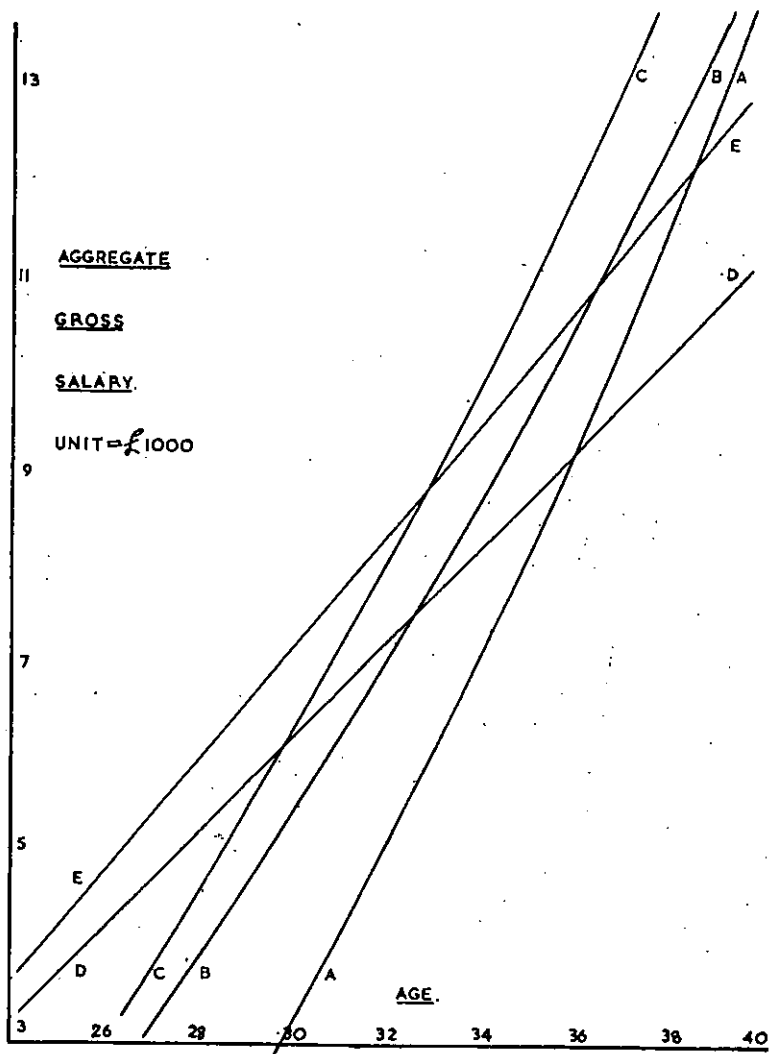
SPECIAL FINANCIAL POSITION OF GRADUATES.

It is not pointed out sufficiently frequently, nor with adequate vigour, that a University student submits to a financial burden from which he rarely recovers before the forties. To illustrate the point the following table has been prepared showing earnings, per year (table I) and in total (table II), (both gross) for five individuals with different careers.

- A. A graduate, M.Sc., or Ph.D., with overseas training, starts University teaching at 25 as a junior lecturer, and advances at the rate shown. A meteoric career in fact. (Data from University advertisements).
- B. A graduate, M.Sc., or B.Sc., starts at 22 and advances at rate shown. This is following the average line from the N.Z.I.C. data for persons in teaching or government work.
- C. A graduate, M.Sc., or B.Sc., starts at 22, in Industry, and follows the salary scale shown. This is the average line shown in the N.Z.I.C. data for industrial chemists. (£100 per year more than B).
- D. Non-graduate. Leaves school at 15 and earns at rates shown. These are approximate statutory MINIMA for a wide range of trades, as shown in New Zealand Year Book, 1953, data for 1952. NO OVERTIME.
- E. Non-graduate. Leaves school at 15 and being slightly above the minimum gains some measure of promotion at 21. Alternatively being industrious earns £100 a year more than D, by overtime or odd jobbing.

The following points emerge:—

1. At the age of 35 the total earnings of all five are approximately commensurate.



GRAND AGGREGATE OF EARNED INCOME

2. Up to approximately 35 the graduates (presupposing that all their education and ancillary costs such as board, travelling, maintenance, were met by vacation work and/or bursary assistance) have earned less, sometimes a great deal less, than the school-leavers. It can be inferred that the graduates standard of living has been lower.
3. The year in which the individuals pass a total salary of £3000 is 30, 27, 27, 24 and 23 respectively. There is a similar tendency at £1000,

£2000, £4000 and £5000. It is manifestly clear that no person could consider house-financing (even with the most stringent economy) until the minimum of £3000 had been passed. The graduate's family life at least in some respects is thus deferred to a later age than the non-graduates. Just what this point involves is in itself a serious matter for the Government.

TABLE I.
Salary Scales (£ per year.)

Age.	A.	B.	C.	D.	E.
Under 21				250	250
22				500	600
23		600	700	500	600
24		600	700	500	600
25		600	700	500	600
26	575	725	825	500	600
27	625	725	825	500	600
28	650	725	825	500	600
29	675	725	825	500	600
30	850	725	825	500	600
31	900	850	950	500	600
32	950	850	950	500	600
33	1000	850	950	500	600
34	1050	850	950	500	600
35	1100	850	950	500	600
36—39	1150	975	1075	500	600
40	1150	975	1075	500	600

TABLE II.
Grand Aggregate of Earned Income. (£)

Age.	A.	B.	C.	D.	E.
Under 21					
22				2250	2450
23				2750	3050
24		1200	1400	3250	3650
25		1800	2100	3750	4250
26		2525	2925	4250	4850
27	1200	3250	3750	4750	5450
28	1850	3975	4575	5250	6050
29	2525	4700	5400	5750	6650
30	3375	5425	6225	6250	7250
31	4275	6275	7175	6750	7850
32	5225	7125	8125	7250	8450
33	6225	7975	9075	7750	9050
34	7275	8825	10025	8250	9650
35	8375	9675	10975	8750	10250
36—39					
40	14120	14550	16350	11250	13250

In actual fact the influence of Social Security and the preferential attack of Income Tax at the higher levels of salary mean that the total nett salary of graduates relative to the non-graduates is lowered at ALL ages, so that the position is considerably worse than presented above.

Further, the graduate is faced with expenses such as professional body fees, book and journal expenses, instruments and certain equipment which are inseparable from the efficient performance of his duties; all expenses which the non-graduate does not need to meet.

The graduate is also expected to take a more than average part in activities connected with the political, cultural and educational life of the community which make further inroads into his money.

He is likely to have to move house and home considerable distances (possibly overseas) on more than one occasion in his early life, with the consequent loss of value and associated expense.

All these factors militate against the financial adequacy of the small fraction of the community which possess the ability and training so needed at present. It is little consolation to the graduate to point out that, 'By the time he is 65 he will be earning 2 or 3 or more times what the non-graduate earns,' for the vital earning period is prior to the forty mark (probably much earlier) and it is the *total* earned to a given date which governs one's bank balance not the *earning rate* at the maximum.

A casual inspection of the figures will reveal the glaring need for a change of policy towards the salaries of young graduates. One solution would be adequate payment during the training period, not merely scholarship assistance, but about £250 per year over and above fees, tuition costs and books, as in fact is now done for Teachers' College students.

The alternative is a drastic revision of the starting salaries in all phases of employment for the young chemist. What is needed is a salary scale which enables the graduate to recover from the serious financial handicap he has placed himself under by his need to study for his qualification and *to recover this by the early thirties at the very latest*. It seems to the writer that, in view of the considerable influence of the chemist on New Zealand's economy, a reasonable level to suggest would be approximate equality between the graduates and E (the school-leaver slightly above the statutory minima) by the time 30 years old is reached. To do this salary increases of more than 20 per cent are needed for B and C.

The salary scale £800 initial by £25 annual increments (on June, 1952 basis) might appear munificent at first glance. However, a graduate starting at 23 on this basis would not be on an equal footing with E until his 31st year. This makes no allowance for income tax, etc., probably 37 years old is nearer the actual figure when all corrections are made.

It can no longer be doubted that the chemical graduate is at a marked financial and consequently social disadvantage for more than the first half of his life's span. No impartial adviser could recommend a youth to follow such a career even if the prospects of reward in the highest levels were commensurate with those obtainable in other professions, which they are not. This adverse financial position must have incalculable effects on the teaching and the learning of chemistry from the earliest days at school to the highest levels possible in this country.

If New Zealand is not to be left behind in the technological advance of our time an adequate supply of chemists of the highest order must be available to and used by all branches of industry, teaching and the government services. The Institute of Chemistry has an obligation to the country in this respect. It can do itself no justice, and chemistry little service unless it brings the very greatest pressure to bear on problems such as these.

"First make a living and then practise virtue."

Aristotle.

G. A. BOTTOMLEY,
Chemistry Department,
University of Otago, DUNEDIN.

DR. W. G. WHITTLESTONE.

Mr. W. G. Whittlestone, Senior Physical Chemist at the Ruakura Animal Research Station, has been awarded the degree of Doctor of Science of the University of New Zealand.

Dr. Whittlestone's work will be well known to Institute Members and to all associated with the dairy industry in New Zealand. He has published numerous papers in local and overseas journals and has made a considerable contribution to knowledge in the fundamental and applied fields. Concerned primarily with the physiology of milking of farm animals his researches have covered a wide field from the fundamental interpretation of milk let-down mechanisms including methods for the assay of the hormones involved, the study of physico-chemical properties of milk, the design of milking machines for



cows (and sows) including some devices which have been patented, the use of detergents in cleaning milking machines, to contributions in the field of electronic "gadgets" developed for this work.

Two years ago Professor C. W. Turner of the University of Missouri spent a year at Ruakura and was associated with Dr Whittlestone in work on their mutual fields of interest. Dr. Whittlestone has now been offered a grant by a milking machine company in the United States to spend a year at the University of Missouri.

There is indeed a long way from a M.Sc. thesis in organic chemistry at Otago University to studies on the psychology of the cow.

Dr. Whittlestone graduated M.Sc., with first-class Honours, from Otago University in 1935 and in the same year was the Sir George Grey Scholar. The following year he was the Duffus Lubecki Scholar.

After three years as research chemist for the New Zealand Co-operative Rennet Company he joined the staff of the Department of Agriculture where he was physical chemist first at Wallaceville and in recent years at Ruakura.

Even with his hobbies Dr. Whittlestone is primarily interested in electronics and mechanical engineering, in other words "gadgets".

In a recent letter to the Hon. Gen. Secretary, I. D. Morton gives these details of his movements:—"When I left New Zealand, I went to Cambridge to work with Professor Todd and completed my Ph.D (Cantab.) in 1948. After that I stayed on at Cambridge for some time on a research grant. I recently joined Unilever, Ltd., at their Food Research Department and am now Section Manager in charge of the Organic Chemistry group there."

BALANCE SHEET AS AT 31st OCTOBER, 1953

LIABILITIES		ASSETS	
1952	£ s. d.	1952	£ s. d.
94	88 12 10	Typewriters:	
325	300 2 0	Balance 31st October, 1952	37 0 0
100	150 0 0	Less Depreciation for year	4 0 0
30	30 0 0	Addressograph Plates:	
—	30 0 0	Balance 31st October, 1952	9 0 0
	918 13 1	Less Depreciation for year	2 0 0
	75 0 0	Subscriptions Overdue	216 7 0
	843 13 1	Less Amount Reserved	50 0 0
	144 12 4	Sundry Debtors	
	988 5 5	National Savings Account	
	695 2 0	(Due 1/7/54)	
919	988 5 5	Cash Balances:	
603	695 2 0	Bank of New Zealand	508 6 11
		Post Office Savings Bank	153 19 6
		Petty Cash on Hand	16 18 7
		Trust Fund Investment:	
		Post Office Savings Bank	679 5 0
			695 2 0
	£2282 2 3		£2282 2 3

W. G. HUGHSON,
Hon. General Secretary-Treasurer.

AUDITORS' CERTIFICATE

We have audited the books of the New Zealand Institute of Chemistry (Inc.) for the year ended 31st October, 1953, and have compared them with the vouchers produced to us, and with the above Balance Sheet and accompanying Statements. We have verified the various cash balances and certify that, in our opinion, the above Balance Sheet shows the true position of the Institute.

DYMOCK, MacSHANE and SCLANDERS,
G. B. MACMORRAN, F.P.A.N.Z.,
Auditors.
Wellington, N.Z.,
February 15th, 1954.

THE TWENTY-THIRD ANNUAL REPORT (ABRIDGED) FOR THE YEAR ENDING 31st OCTOBER, 1953.

Council has pleasure in presenting to members a record of activities for the year ending 31st October, 1953.

MEMBERSHIP

Membership figures for the last three years are as follows:--

	1951	1952	1953
AUCKLAND	77	89	90
WAIKATO	24	28	34
MANAWATU	31	37	34
WELLINGTON	133	142	137
CANTERBURY	65	68	76
OTAGO	52	54	55
OVERSEAS	47	37	42
	<hr/>	<hr/>	<hr/>
	429	455	468

Twenty-eight new members were elected during the year, including one Fellow, R. N. Woodward, and twenty-seven Associates.

Leave of absence for the year with remission of subscription was granted to nine members.

Resignations were accepted from thirteen members and one name was removed from the roll owing to non-payment of subscription.

LIFE MEMBERS:

Mr R. L. Andrew, Mr F. T. Seelye and Mr H. Rands, all retired, were elected honorary Life Members of the Institute.

OBITUARY:

Council regrets to announce the death of a foundation member, Mr R. M. Bruce, B.Sc., A.R.S.M., A.R.I.C., A.N.Z.I.C., of the Patents Office, Wellington.

SUB-COMMITTEES OF COUNCIL:

Council is again indebted to the many Committees of Council which voluntarily carry out the work of the Institute. Special mention was made at the General meeting in Dunedin of the good work these 100 or so members do each year. A brief summary of the various reports is recorded here.

1. CONFERENCE:

Conference, 1953, was held at the University of Otago, Dunedin, from August 26th to 28th. The Otago Committee did a very excellent job in organising and running a most successful Conference. One of the outstanding features of the Conference was the presence with us of Professor Harry Julius Emeleus, D.Sc. (Lond.), A.R.C.S., F.R.S., F.R.I.C., of the University of Cambridge. Professor Emeleus proved to be a most likeable personality and quite a proportion of our membership had the opportunity of meeting him personally, for not only did we see him at nearly all the Conference meetings and social occasions, but during his fortnight in New Zealand he visited each University College for talks with the staffs and students and addressed each Branch of the Institute. We are indebted to the Royal Australian Chemical Institute and in particular to the New South Wales Branch for extending to us the opportunity of having Professor Emeleus in New Zealand for a short period before he commenced a similar tour in Australia.

2. EXAMINATIONS COMMITTEE:

Otago has again shouldered the responsibility for organising all Institute examinations. The main task is arranging the many details connected with the annual examinations for Laboratory Assistants. Eleven candidates sat a total of twenty-one papers, and selected three optional subjects. Amendments were made to the syllabus and additional subjects added and the new Syllabus of examination requirements for the Laboratory Assistant's Certificate produced in cyclostyle form.

A considerable amount of time was also spent considering a new syllabus of examination requirements for election to the Associate-ship of the Institute by examination. Responsibility for this examination was accepted when the University of New Zealand informed us that it would no longer set papers for non-matriculated persons.

3. JOURNAL:

The Auckland Committee with Mr S. G. Brooker as Editor has now completed six years of service to the Institute. Mr Brooker has been appointed one of the two joint secretaries for the Royal Society Congress next May, and has nominated Mr G. M. Wallace, at present Assistant Editor, to be Editor for 1954.

It is also felt by the Auckland Committee that in accordance with a general policy of the Institute that jobs should slowly circulate round the branches, the task of producing the journal should at this juncture be transferred, say in 1955, to another branch. Manawatu has been asked to consider the proposition and we trust they will be able to take it on. Mr Brooker will continue on the Editorial Committee in the coming year, but on this, the occasion of his retirement from the post of Editor, Council would again place on record its gratitude to him for carrying out with distinction the duties of Editor of the Journal over a period of six years.

Mr Brooker has taken a strong line throughout and has made some valuable contacts abroad. During his time as Editor we have had a large number of requests from foreign libraries and Universities for complete sets of the Journal. Incidentally back numbers no longer required by members would be appreciated for the filling of such requests, and should be sent to P.O. Box 250, Wellington. To return to Mr Brooker, his New Zealand policy has always won the grateful thanks of Council. The number of issues per year was increased from four to five which gives an issue each two months with a break over the Christmas holiday period. Publishing the Journal is one of our main expenses but societies the world over find this to be the case. On the other hand a well produced Journal can be one of the most valuable services to our membership, and this, we feel, has been the case during the Editorship of Mr Brooker. On behalf of the membership please accept our grateful thanks for six years of valued work to the Institute.

EMPLOYMENT OFFICER:

Instead of a committee with a New Zealand tie-up, Council decided this year to appoint one man to the position of Employment Officer.

A number of requests come from chemists in Great Britain or from other countries seeking employment in New Zealand in some particular line. Much of the information is of a semi-confidential nature and is handled most efficiently by an individual officer. Mr Borthwick has carried out these duties as well as any other jobs connected with the employment of chemists which Council may hand on to him.

MEMBERSHIP COMMITTEE:

We are indebted to three of our senior Fellows, Professor L. H. Briggs, Mr W. A. Joiner and Dr R. Gardner for spending a considerable amount of time checking and reporting to Council on the relative merits of applicants for admission to the Institute as Associates or Fellows. This year twenty-eight members were admitted.

PATENTS OFFICER:

It speaks well for the enthusiasm of Mr E. S. Borthwick that he has consented to carry out the duties of Patents Officer as well as those of Employment Officer. It has been found that a service can be rendered to fellow chemists by drawing their attention to information in the Patents Journal, which is very frequently not consulted regularly by them. We are fortunate at the present time in that one of our members is an examiner of chemical patents in the Patents Office.

PROFESSIONAL STATUS COMMITTEE:

This committee which is in the Auckland area has been given some difficult jobs to sort up. They have now reported in a preliminary way on the standards of admission to corporate membership of the various Institutes of Chemistry in the Commonwealth. A more detailed examination of the various current by-laws, rules and regulations, is now being undertaken and we already have an indication that other Empire Institutes will be extremely interested in the final report.

STANDARDS COUNCIL:

We are glad that Mr G. A. Lawrence (past president) has agreed to represent the Institute on the Standards Council. We also congratulate him on being re-appointed Chairman of the Standards Council for a further term.

STANDARDS INSTITUTE:

Mr C. L. Stonyer has now assumed the post of officer in charge of all Standards Institute affairs. It will be remembered that Mr M. L. H. Stewart carried out these duties very efficiently over a period of many years. Under Mr Stonyer there are a number of representatives on the many committees of the Standards Institute which require the services of a chemist. Some of these committees are active, whereas others have no immediate work in hand.

SALARIES COMMITTEE:

This committee carried out the third salary survey in 1952 and has not been on any special investigation this year. It is, however, a matter of continuing interest to all members and particularly so from an Institute point of view. The Institute from its early days has taken deputations or made written protests where the salary of chemists did not correspond with that of fellow professionals. A case is at present being prepared for presentation to the Public Service Commissioner showing why starting salaries for chemists should be as attractive as for other professions.

INSTITUTE PRIZES:

The I.C.I. Prize for 1953 was awarded to Mr L. Hartman of the Fats Research Laboratory, Wellington.

The Morcom Green and Edwards Prize was awarded to Dr B. B. Marsh of the Food Section of the Dominion Laboratory, Wellington.

Regulations governing the Easterfield award are now finalised and it is hoped that the first award will be made in 1954 in Nelson.

It should be mentioned that Dr A. D. Campbell, who has recently gone overseas on a scholarship, was highly commended for his entry for the Morcom Green and Edwards Prize.

SCIENTIFIC SOCIETIES:

Meetings have taken place during the year with the Royal Society in order to discover a basis for closer liaison between scientific bodies in New Zealand, more particularly for occasions of national import when definite action or a definite opinion is required from scientists as a whole. The matter is difficult but is being proceeded with at the present time.

OVERSEAS VISITORS:

The visit this year of Professor Emeleus as an extension to his Australian tour has been reviewed above under the Conference heading. Council feels that the financing of these visits might be set on a better footing and suggestions are to hand for the setting up of a small fund to enable Council to proceed more expeditiously with the organisation of such visits.

FINANCIAL:

The balance sheet shows that the Institute's finances are in a healthy position although the further large increase in the amount of overdue subscriptions is a matter of some concern. The Income and Expenditure Account shows a satisfactory surplus of income over expenditure for the year.

The Trustees of the Trust Fund have decided, with the approval of Council, to invest £500 of the fund in New Zealand Government stock.

UNESCO:

We maintain our representation on the National Commission and have three members on the Scientific Sub-Committee. A great deal of the work of Unesco seems to be in fields other than the scientific and most of the literature received is of general interest only. At the same time we, as chemists, have had contact with chemists from other countries, particularly far eastern countries through the workings of the Colombo Plan.

FOOD PARCELS:

This great and much appreciated service has now come to an end. Chemists in New Zealand were gratified to hear how much the parcels were appreciated by the recipients in England. With the greater availability of specific goods and the excessive postage rates for such parcels it was decided to conclude the scheme as an Institute organisation and to thank all those who assisted in the dispatch of the goods over many years.

LIST OF OFFICERS:

As usual, a list of officers for the whole of New Zealand for the year 1954, including Council, the six Branch Committees, and members of Council, will be attached to this report.

BRANCH MEETINGS.

A list of all papers read before Branches during the year is attached to this report.

THANKS.

We would again thank Mr. Joiner for inscribing in his inimitable manner all certificates issued by the Institute. Instead of individually thanking the many members who contribute to the smooth running of the Institute we should perhaps express appreciation to all those responsible for a successful twelve months of co-operative enterprise.

CONGRATULATIONS:

Our retiring President has been on the Executive for all too short a period but to Dr. Annett we extend our warmest thanks for a successful year and at the same time we would congratulate him on his election to the Hamilton City Council.

FOR AND ON BEHALF OF COUNCIL.

W. G. HUGHSON,

Hon. General Secretary-Treasurer.

LIST OF OFFICERS.

FOR THE YEAR 1st NOVEMBER, 1953—

31st OCTOBER, 1954

President: Dr. H. O. Askew, Cawthron Institute, NELSON.

Vice-President: Mr K. M. Griffin, Government Analyst, Durham St. West, AUCKLAND.

Hon. Gen. Secretary: W. G. Hughson, P.O. Box 250, WELLINGTON.

Auckland Delegate: J. Ricketts.

Waikato Delegate: F. E. Mason.

Manawatu Delegate: C. V. Fife.

Wellington Delegate: Dr. L. G. Neubauer.

Canterbury Delegate: F. H. G. Johnstone.

Otago Delegate: O. H. Keys.

Editor of Journal: G. M. Wallace, Dominion Lab., Durham St., West, AUCKLAND.

Past President: Dr. H. E. Annett.

Registrar: V. J. Wilson, Technical Publications Ltd., Box 250, WELLINGTON.

Assistant Secretary: B. G. Stanley, C/o Shelf Co. Pty, Ltd., Box 2091, WELLINGTON.

AUCKLAND BRANCH.

Chairman: J. Ricketts, 113 Valley Rd., Auckland S.2.

Secretary: H. C. Clark, C/o. Chemistry Dept., Auckland University College, AUCKLAND.

Treasurer: G. Dingley, Dominion Compressed Yeast Co., Ltd., P.O. Box 10, AUCKLAND.

Committee: L. Jagger, W. J. Wilson, P. J. Gallaher and R. C. Selkirk.

WAIKATO BRANCH.

Chairman: F. E. Mason, Ingleton Tc., Fairfield, HAMILTON.

Secretary: E. P. White, Ruakura Animal Research Stn., P. B. HAMILTON;

Committee: Miss M. P. Bartrum, R. E. R. Grimmett, N. T. Clare and K. J. McNaught.

MANAWATU BRANCH.

Chairman: C. V. Fife, Massey College P.O., PALMERSTON NORTH.

Secretary-Treasurer: Dr. J. W. Lyttleton, Grasslands Division, P.O. Box 623, PALMERSTON NORTH.

Committee: Dr. A. T. Johns, Dr. J. C. Dacre, Dr. R. M. Dolby and E. C. Jessop.

WELLINGTON BRANCH.

Chairman: Dr. L. G. Neubauer, Dominion Laboratory, WELLINGTON.

Secretary: Miss H. E. Barr, Dominion Laboratory, WELLINGTON.

Treasurer: Dr. W. E. Harvey C/o. Victoria University College, P.O. Box 196, WELLINGTON.

Committee: T. A. Rafter, H. J. Wood, Dr. W. S. Metcalf and J. A. D. Nash.

CANTERBURY BRANCH.

Chairman: F. H. G. Johnstone, P.O. Box 325, CHRISTCHURCH.

Secretary-Treasurer: R. W. Cawley, Wheat Research Inst. Hereford St., CHRISTCHURCH.

Committee: S. M. Betty, M. S. Carrie, Dr. H. N. Parton and Dr. B. R. Penfold.

OTAGO BRANCH.

Chairman: J. Rogers, School of Mines, University of Otago, DUNEDIN.
Secretary-Treasurer: Dr. G. A. Bottomley, Chemistry Dept. University of Otago.

Committee: G. W. Broughton, H. M. D. Wilson, Dr. G. M. Richardson.
 SUB-COMMITTEES 1/11/53-31/10/54.

1. *CONFERENCE COMMITTEE* 1954:
 Dr. H. O. Askew, Dr. L. G. Neubauer.
2. *EMPLOYMENT OFFICER:*
 E. S. Borthwick, 39 Northland Rd., WELLINGTON, W.2.
3. *EXAMINATION COMMITTEE:*
 O. H. Keys (Chairman), Dominion Laboratory, P.O. Box 562, DUNEDIN.
 C. R. Edmond (Secretary), C/o Dr. R. Gardner, 41 Dowling St., DUNEDIN.
 Dr. G. A. Bottomley, J. W. McChesney and H. G. Woolman.
4. *JOURNAL EDITORIAL COMMITTEE:*
 G. M. Wallace (Editor) Dominion Lab. Durham St. West, AUCKLAND
 A. G. Frieberg (Business Manager) 42 Nottingham St., Westmere, AUCKLAND.
 G. W. Stace (sec.), Dr. H. Bloom, D. Whillans and S. G. Brooker.
5. *MEDICAL ADVERTISEMENTS COMMITTEE:*
 L. H. James (Convenor), Dominion Laboratory, Sydney St., WELLINGTON N.1 and N. H. Law.
6. *MEMBERSHIP COMMITTEE:*
 W. A. Joiner, Dr. R. Gardner, Dr. L. H. Briggs.
7. *PATENTS OFFICER:*
 E. S. Borthwick, 39 Northland Rd., WELLINGTON W.2.
8. *PROFESSIONAL STATUS COMMITTEE:*
 J. Ricketts (secretary), 113 Valley Road, AUCKLAND, S.2.,
 F. H. V. Fielder, Dr J. C. Andrews and D. Whillans.
9. *STANDARDS INSTITUTE OF NEW ZEALAND:*
- 9.1 *Representatives on N.Z. Standards Institute Councils*
 G. A. Lawrence, JOHNSONVILLE.
- 9.2 *Chief Representative for all Standards Institute Affairs:*
 C. L. H. Stonyer, 47 Mandalay Tce, WELLINGTON N.5.
- 9.3 *Representatives on special Standards Institutes Committees: Chemical, Insecticides, Domestic Refrigeration & General:* C. L. H. Stonyer.
Roadmaking Materials and Methods: Road Testing Material:
 J. B. Hyatt, Dominion Laboratory, WELLINGTON.
Electro-Plating and Protective Metal Finishes:
 Dr. R. Gardner, 41 Dowling Street, DUNEDIN, C.1.
Rodent Poisons, Refrigeration and Timber Preservation:
 C. G. Mason, P.O. Box 632, WELLINGTON.
Metal Containers: Paints:
 J. M. C. Tingey, 20 Cavendish Square, WELLINGTON E.5.
Textiles:
 Dr. L. F. Story, Woollen Research Assn. University of Otago, DUNEDIN.
10. *U.N.E.S.C.O. REPRESENTATIVE:*
 J. A. D. Nash, Dept. Scientific & Industrial Research, WELLINGTON.
11. *SALARIES COMMITTEE:* Dr. J. K. Dixon, J. L. Mandeno.

LIST OF PAPERS READ BEFORE BRANCHES, 1952-53

AUCKLAND:

Sex Hormones in Plants.	Prof. V. J. Chapman.
Food for Thought from the U.S.	H. A. L. Morris.
Geology of the Auckland Area.	E. J. Searle.
Ceramics.	K. E. Seal.
Radioactive Tracer and Magnetic Methods in the Study of Complex Salts.	A. L. O'Dell.
Petroleum's Contribution to Industry.	R. L. Thompson.
A Chemist Gone Wrong.	Dr. H. E. Annett.
Recent Advances in the Chemistry of Fluorine.	Prof. H. J. Emeleus.
The Hormones of the Posterior Pituitary Gland.	W. G. Whittlestone.

WAIKATO:

Experience of Research Stations in Britain	Miss M. P. Bartrum.
The Problem Area of the Bombay State.	Dr. N. Rege.
Radio-phosphorus in Agricultural Research.	F. D. Dorofacff.
Forensic Chemistry.	K. M. Griffin.
Ruakura Studies on the Efficiency of the Dairy Cow.	R. J. Lancaster.
The New Chemical Elements.	Prof. H. J. Emeleus.
Methods for the Determination of Molybde- num in Agricultural Materials.	J. L. Grigg.
Colorimetric Determination of Magnesium.	T. A. Mitchell.

MANAWATU:

Chemical and Medico-Legal Aspects of Bio- chemistry.	Dr. T. H. Pullar.
Some Recent Advances in Biochemistry.	Dr. A. T. Johns.
Muscular Contraction.	Dr. B. B. Marsh.
Organisation of Agricultural Research in New Zealand.	Dr. H. E. Annett.
Symposium on Chromatography.	Dr. Newbold.
	Dr. Lyttleton.
	Dr. Johns.
	Mr. Bathurst.
Radioactivity in the Service of Man	Prof. H. J. Emeleus.
Lipoproteins	Dr. C. Hawke.

WELLINGTON:

Skins and Leather.	F. W. Woodroffe.
Trends in the Use of Pesticides.	P. J. Clark.
Heartwood Extractives.	Dr. W. E. Harvey.
Wood.	Dr. L. G. Neubauer.
Some Applications of Statistics to Chemistry.	Dr. R. M. Williams.
Some Aspects of the Problem of Ionic Solu- tions.	Prof. H. N. Parton.
Some Recent Developments in the Petroleum Chemicals Industry.	B. E. Stanley.
Current Research At Victoria University College.	T. A. Turney.
	Miss L. Greig.
	H. W. Melhuish.

CANTERBURY:

The Principle of Corresponding States.	Dr. M. L. McGlashan.
Science and Leather.	Dr. R. O. Page.
X-ray Diffraction and Chemical Structure.	Dr. B. R. Penfold.
Some Scientific Reminiscences of the War in the Middle East.	M. S. Carrie.
Modern Anaesthetics.	Dr. S. C. Peddie.
Current Research in Inorganic Chemistry.	Prof. H. J. Emeleus.
Theories of Adsorption.	S. R. Siemon.
Nitrogen Economy and the Grass-Clover Association.	Prof. T. W. Walker.

OTAGO:

Recent Advances in Pharmacological Chemis- try.	Dr. F. N. Fastier.
Water.	O. H. Keys.
Recent Advances in Tanning Techniques.	N. P. Lino.
The Solid State.	Prof. F. J. Llewellyn.
Some Aspects of the Chemical Effects of Ion- ising Radiations.	Dr. H. C. Sutton.
Research Evening.	C. L. Davey.
	G. Dunckley.
	Dr. J. Murray.

BRANCH CHAIRMAN

MR F. H. G. JOHNSTONE (Canterbury Branch)

Mr F. H. G. Johnstone brings to office long experience of Institute affairs, having been a member since 1931, secretary-treasurer of the Canterbury branch from 1941 to 1953, and delegate-to-Council for the branch almost continuously since 1944.

Mr Johnstone received his secondary education at the Waitaki and Christchurch Boys' High Schools and after serving for some years as demonstrator and laboratory assistant in chemistry at Canterbury College, joined the Dominion Compressed Yeast Co., Ltd, as a chemist and factory supervisor. He is now assistant works manager.

The new chairman's interests are wide and he has held a considerable number of executive positions in various spheres. He has served on the Management Committee and Wilding Tennis Park Committee of the Canterbury Lawn Tennis Association for a number of years, and also as a Canterbury delegate to the New Zealand Lawn Tennis Association Council. He is a member of the Council of the Canterbury Branch of the New Zealand Institute of Management, and has served as Canterbury Branch President of the Waitaki High School Old Boys' Association.



MINUTES OF A MEETING COUNCIL HELD IN WELLINGTON ON FRIDAY, 26th FEB., 1954. (Abridged)

- 1. Present:** Dr. H. O. Askew, President, in the chair; K. M. Griffin, Vice-President; B. E. Jackson, Auckland Proxy; A. J. Metson, Waikato Proxy; C. V. Fife, Manawatu Delegate; T. A. Rafter, Wellington Proxy; F. H. G. Johnstone, Canterbury Delegate; L. H. James, Otago Proxy; B. G. Stanley, Assistant Secretary; V. J. Wilson, Registrar; W. G. Hughson, Hon. Gen. Secretary-Treasurer.
- 2. Apologies:** Received from all delegates not attending.
- 3. Welcome:** This, the first meeting for 1954, was attended by three newly elected officers:—Messrs. Griffin, Fife and Stanley. The President welcomed Mr. V. J. Wilson of Technical Publications Ltd. and stated that he would be taking over the duties of Registrar.
- 4. Minutes:** The minutes of the Annual Meeting held on November 25th, 1953, were taken as read and confirmed subject to the addition of Dr. McGlashan's name to the list of apologies.
- 5. Registrar: RESOLVED, Wellington/Manawatu:**
That Mr. V. J. Wilson be appointed Registrar in accordance with the Rule authorising Council to appoint such an officer.
RESOLVED, President/Wellington:
That the offer of Technical Publications Ltd. to undertake the secretarial and general office work of the Institute for £120 per annum be accepted, the situation to be reviewed at the end of October 1954.
RESOLVED, President/Manawatu:
That the Hon. General Secretary be asked to write to Mr. H. K. Palmer thanking him and his firm for their services to the Institute during his term of office as Registrar.
- 6. Conference 1953: RESOLVED, President/Wellington:**
That the final report and financial statement from the 1953 Conference Committee, Dunedin, be received and that the committee be thanked very cordially for the interesting and informative Conference which it had organised.
- 7. Conference 1954:** Mr. Rafter stated that Conference dates were August 24th to 27th. Conference would be opened in Nelson on the evening of Tuesday, August 24th. Full information and advice about bookings will be in the next issue of the Journal.
- 9. Examinations Committee: RESOLVED Vice-President/Manawatu:**
That the letter from the Solicitor re ACCIDENT LIABILITY be received and that a copy be forwarded to the Examinations Committee and that the Hon. General Secretary write to the Secretary of the Royal Institute of Chemistry, London, to inquire what action is taken to insure examinees. Further, that inquiries be made of an insurance company in Wellington regarding the type of policy most suitable for our requirements.
RESOLVED, Otago/Canterbury:
That the report of the Examinations be received, that official notification be forwarded to each candidate and that Laboratory Assistant Certificates be awarded to the following three candidates who have completed the necessary subjects and have done the required practical work:
Miss June Shirley Taylor, Forest Research Institute, Rotorua.
Miss Enid Lyall Wiseman, Abel's Ltd., Auckland.
Miss Jean Anne Sutton, Soil Bureau, Wellington.

REGULATION 1:

It was moved on behalf of the Otago Branch:

That the Otago Branch Committee, considering the admission of Associates by examination to be a matter of major policy in Institute affairs, requests that a postal ballot of all members be held to decide whether or not the Institute should conduct its own examinations.

The motion was seconded, pro-forma, by Manawatu and the history of our relations with the University regarding examinations was discussed. The motion was put and lost, Otago, only, voting for it.

Examination requirements for the admission of Associates.

The draft Regulation 1 was then considered and several small matters were referred back to the Examinations Committee for amendment.

10. *Journal.* RESOLVED, Canterbury/Wellington:

That Mr. S. G. Brooker be appointed Assistant Editor of the Journal for the current year.

RESOLVED, President/Manawatu:

That Council record a hearty vote of thanks to Mr. S. G. Brooker for his services as Editor of the Journal and that the Hon. General Secretary forward to him a letter expressing Council's appreciation of the very valuable contribution he has made to the work of the Institute.

The President commented on the excellent standard of the Journal and the work required to bring it out regularly and to schedule. His remarks were heartily endorsed by delegates. Appreciation was also expressed that Mr. Brooker would be continuing on the Editorial Committee as Assistant Editor and in charge of overseas exchanges.

RESOLVED, President/Auckland:

That in appreciation of his long and valued services to the Institute a set of Journals from 1936 to 1953 be bound and presented to Mr. S. G. Brooker, each volume to be suitably inscribed.

RESOLVED. Vice-President/Wellington:

That the bound sets of Journals held by the Editor and the Hon. General Secretary be brought up to date with the addition of the fourth volume covering the years 1951-1953 and that a complete set be bound and held in the office of the Registrar and that in future six copies of each issue be held in safe storage on behalf of Council.

11. *Professional Status Committee.* The report concerned Rules and was deferred for consideration under "Rules" (see below).13. *Salaries.* Dr. Johns and Dr. Dixon reported progress re starting salaries for M.Sc.'s and the work is continuing.17. *Prizes.* All Branches have been appraised of the closing date and have been asked to give members notification and information relating to the I.C.I., the Morcom Green, Edwards, and the Industrial Chemical Essay Prizes.

Special mention was made of the Easterfield Medal and a copy of the regulations was tabled.

18. *Applications for Associateship.*

RESOLVED: President/Wellington:

That the following be elected Associates of the Institute:

Allan Douglas Shand, B.Sc., B.Agr.Sc., Ballins Breweries, Box 619, Christchurch (Chemist).

Stanley Weston White, B.Sc., Davis Gelatine (N.Z.) Ltd., Connal St., Woolston, Christchurch (Chemist).

Dorothy June Sutor, M.Sc., Auckland University College, (Junior Lecturer in Chemistry.)

Peter Alan McConnon, M.Sc., Associated Foods Ltd., Box 2356, Auckland (Chemist and Production Manager). Robert Ian Appleyard, B.Sc., National Carbon Pty. Ltd., Box 6146, Wellington (Acting Head of Works Laboratory).

Mr. F. H. G. Johnstone reported that he had seen Mr. Dimmock in Melbourne and the Royal Australian Chemical Institute accepts Melbourne and Sydney Technical College Certificates as the necessary theoretical qualification for joining their Institute.

19. *Membership.*

RESOLVED, Canterbury/Wellington:

That leave of absence with remission of subscription be granted to Mr. W. E. Browne for the years 1951 and 1952

RESOLVED, Vice-President/Wellington:

That the resignation of Mr. S. E. Wright be accepted as from the time he left for Australia but that he be asked to pay for Journals and to state if he wishes this service to continue.

20. *Names Removed from the Roll.*

RESOLVED: President/Wellington:

That in accordance with Rule 7, no reply having been received to a final registered request for payment of outstanding subscriptions, the following names be removed from the register and official notice be sent to each by registered post: Mrs. E. V. Allen, R. V. Harpur, J. F. Martin, C. D. Calvert, I. B. Bennett, D. S. Latham, J. D. McDonald.

22. *Overseas Visitors.*

A letter of thanks was received from Professor Emeleus. Mr. F. H. G. Johnstone said C.S.I.R.O. had helped to finance Professor Emeleus' tour in Australia and other names had been mentioned for future visits of overseas scientists to this side of the world.

Dr. Leslie Lampitt will be in New Zealand in May 1954 and D.S.I.R. considers he will be available for lectures to the Institute.

23. *International Union of Pure and Applied Chemistry.*

Dr. Lampitt is treasurer of this Union and will be asked to discuss New Zealand's position when he is here.

26. *Trust Fund.*

RESOLVED, Manawatu/Canterbury:

That the £500 recommended for investment in last Minutes be placed for a period of 10 years at 4% in approved investments.

27. *Accounts for Payment.*

Accounts for payment amounting to £103/15/8 as shown on A. 316 were passed for payment.

28. *Pcils. (Professional Chemistry Institutes Liaison Service.)*

This service was instituted at a meeting, in London, of Empire Institutes of Chemistry when Professor Soper and Sir Theodore Rigg represented New Zealand. It was suggested in the first place that the various Institutes exchange Journals and this service has been continuing for some time. It was suggested by Council that Journals received by Branches be displayed at Branch meetings for 6 months and that the whole question of liaison with other Chemical Institutes be discussed at the Conference.

29. *Visit of Duke of Edinburgh.*

After a lengthy discussion of the general arrangements which were made for N.Z. Scientists to meet the Duke of Edinburgh it was

RESOLVED, Vice-President/Auckland:

That in view of the unsatisfactory manner in which the Royal Society called N.Z. Scientists together to meet the Duke of Edinburgh, this

Council suggests that on any similar future occasion, representatives of other scientific Societies be co-opted to act on a combined Committee. The Secretary was asked to send a letter to the Royal Society setting out this resolution and also some of the other points which had been made by Dr. Annett (President 1953) and Council members.

Appreciation was expressed to Mr. V. J. Wilson for the invitation which was extended to Chemists attending the Duke's lecture to attend an informal afternoon tea and "get together" in the offices of Technical Publications Ltd. This was very much appreciated especially by visiting Chemists.

30. *List of Members.*

This List will now be produced as an Institute publication and all alterations to addresses or amendments to qualifications must be in the hands of the Hon. General Secretary, P.O. Box 250, Wellington, by March 31st 1954.

31. *Benevolent Fund.*

This was held over till next meeting.

32. *Dairy Science.*

Manawatu reported that after due consideration they would recommend that Dairy Science be not put forward as an alternative to Chemistry for admission of Associates. Report received and Manawatu thanked for their report.

34. *Rules.*

The Hon. General Secretary pointed out that Council had spent a full day in November, 1952, when Professor Slater was President, finalising amendments to the Rules. Since then further discussions had been held with a constant request for publication as soon as possible. With last Agenda a complete draft of the amended Rules was circulated to clear up minor inconsistencies but not with the object of introducing new points for discussions.

The Vice-President considered our procedure was undemocratic and that rules should be submitted to, and considered by the membership of the Institute.

Mainly on account of shortage of time the following resolution was passed:

RESOLVED, Otago/Wellington.

That a sub-committee consisting of those members of Council or their proxies present at this February meeting of Council, be appointed to consider recent Branch suggestions and to bring down the final draft of the Rules for printing; to meet in Mr. James' office, Dominion Laboratory on March 15th at 6 p.m. (The Vice-President recorded his dissentient vote.)

35. *Thanks.*

The Vice-President (as Chairman of the latter part of the meeting) thanked the Shell Co. for the use of the Conference Room for our meeting.

W. G. Hughson,

THE EASTERFIELD MEDAL

The conditions for the Easterfield Medal, which will be awarded for the first time this year, are set out below. The medal honours the memory of Sir Thomas Easterfield, the first Professor of Chemistry at Victoria University College and, subsequently, the first Director of the Cawthron Institute.

The die for the medal has been given by the Royal Institute of Chemistry in London and the medal in silver will be the gift of the New Zealand Section of the Royal Institute of Chemistry. One side of the medal will bear a representation of the Seal of the Institute—the standing figure of Priestley surrounded by the name of the Royal Institute of Chemistry. On the reverse side will be engraved the words "The Easterfield Medal" with space for engraving the date and the name of the recipient. The first award will be made in time for the Combined Institutes of Chemistry Conference at Nelson where Sir Thomas Easterfield lived in retirement.

The New Zealand Section of the Royal Institute of Chemistry is firmly resolved that the medal will be awarded only for research work of high calibre. No award will be made if the standard is not sufficiently good, in which case the medal will be available for competition in the following year.

To mark the inauguration of the award of the Easterfield Medal, the Committee is arranging a function in August in which Lady Easterfield and Sir Harry Jephcott, President of the Royal Institute of Chemistry, have been invited to participate. At this time the medallist will give his lecture.

The care that the joint committee of the two Institutes will take in the selection of a suitable medallist and the fact that the President hopes to be present in person will affirm to the medallist that he has been truly honoured by his colleagues, and will assure the old students and scientific friends of Professor Easterfield that the encouragement that he gave so freely to research lives on.

May I commend this award to you. Sir Thomas Easterfield had a genuine interest in both pure and applied chemistry. The best tribute that could be paid to him now would be a strong competition from all sections of the chemical community for the Easterfield Medal.

J. K. DIXON,

Chairman,

New Zealand Section,

Royal Institute of Chemistry.

Conditions for the Easterfield Medal

The Easterfield Medal, provided by the ROYAL INSTITUTE OF CHEMISTRY, is an award in honour of the late SIR THOMAS HILL EASTERFIELD, K.B.E., M.A. (Cantab.), Ph.D. (Wurzburg), F.R.S.N.Z., F.R.I.C., F.N.Z.I.C. (Hon.).

Sir Thomas Easterfield was well known for the distinguished contributions he made to the advancement of chemistry, and will be remembered particularly for the inspiration and encouragement he gave his students

during the many years he was Professor of Chemistry at Victoria University College and for his infectious enthusiasm for chemical research.

He was the first Chairman of the NEW ZEALAND SECTION OF THE ROYAL INSTITUTE OF CHEMISTRY, and it is appropriate therefore that authority to make awards of the medal should be vested in the Committee of that section. Moreover, as he was one of the early Presidents of the NEW ZEALAND INSTITUTE OF CHEMISTRY, it is fitting, and in accordance with the wishes of the Council of the Royal Institute of Chemistry, that that Institute should also be associated with the award.

Awards of the Easterfield Medal will accordingly be made by the Committee of the New Zealand Section of the Royal Institute of Chemistry, on the recommendation of a Selection Committee consisting of the Chairman of the New Zealand Section of the Royal Institute of Chemistry (convenor) and the President of the New Zealand Institute of Chemistry, together with a Professor of Chemistry of the University of New Zealand whom they shall invite to act with them. The Selection Committee will have the right to co-opt any suitable person in an advisory capacity.

Conditions of the Award

(1) Awards of the medal shall be made to chemists within New Zealand in recognition of the outstanding quality and originality of their research work.

(2) Candidates must be under the age of 35 years at 30th April in the year of the award.

(3) The major portion of a candidate's research work submitted must have been carried out in New Zealand.

(4) Subject to the above limitations, the award shall be open to all chemists in New Zealand, whether or not they are members of the Royal Institute of Chemistry or the New Zealand Institute of Chemistry, but the Easterfield Medal shall not be awarded to any person more than once.

(5) Each Easterfield Medallist will be required to deliver a lecture on the subject of his research at a Combined Conference of the New Zealand Section of the Royal Institute of Chemistry and the New Zealand Institute of Chemistry, or at some other time or place, and the medal will be presented to him on the occasion of his lecture. Travelling expenses necessarily incurred by the Medallist in connection with the delivery of his lecture will be defrayed.

(6) The medal will be awarded first in 1954. Thereafter, awards will normally be made in alternate years, but the Committee reserves the right to make no award in any year if work of sufficient merit is not submitted.

(7) Applications by or on behalf of candidates for the award must be sent to the Hon. Secretary of the New Zealand Section of the Royal Institute of Chemistry, c/o P.O. Box 250, Wellington, C.I., so as to reach him *not later than 30th April, in the year of the award.*

EARLY HISTORY OF OTAGO BRANCH, NEW ZEALAND INSTITUTE OF CHEMISTRY.

These notes were compiled in November, 1952, at the request of the Branch Committee, by C. L. Carter and Roy Gardner. The sources have been mainly the minute books and the memories of the compilers.

In order to see the early history of the Branch in correct perspective it is necessary to consider the whole question of organization of chemists in New Zealand at relevant times.

The New Zealand Section of the Institute of Chemistry of Great Britain and Ireland (afterwards the Royal Institute of Chemistry) was formed in 1927. A meeting of members of the Institute of Chemistry of Great Britain and Ireland was held on 2nd November, 1926, for the purpose of forming a New Zealand Section. The procedure necessary was to sign an application to the Council of the Institute for permission to form a Section and to draft rules. The meeting was chaired by Prof. T. Easterfield, and a resolution was passed "That a branch of the Institute of Chemistry be formed in New Zealand." The minutes of this meeting were confirmed on 21st July, 1927, and the first Annual Meeting was held on 27th January, 1928. This was the first Dominion organization of chemists. Many members of the chemical profession had been members of the New Zealand Institute (afterwards the Royal Society of New Zealand) but there had been no Dominion organization of chemists as such.

From, or even before, the formation of the Section of the Institute of Chemistry of Great Britain and Ireland there had been discussion as to the advisability of forming an autonomous New Zealand body. There were advocates for the immediate formation of such a body; on the other hand there were those who believed or hoped that the formation of the New Zealand section was all that would be required. Even among those who visualised the ultimate formation of an autonomous New Zealand body, some thought that the Section would fulfil all needs for some considerable time and it would be a mistake to form a purely New Zealand body too soon. Prof. J. K. H. Inglis was emphatically of this opinion.

There were two very strong arguments in favour of the formation of the purely New Zealand body. In the first place the local section of the British body was, quite properly, precluded from committing the Institute or speaking in the name of the Institute on any matter involving policy without explicit permission from the central organization in London. This would mean long delays as well as the strong probability that at times London would not appreciate the local position fully, and in the event of the organization's having to take a stand, as it was certain to do sooner or later, on such matters as salaries or status of chemists, the Section as such would be powerless. In the second place the Section was by no means completely representative of New Zealand Chemists. There were many chemists, including some influential ones, who were not eligible for the membership of the British Institute and a few (including Prof. Worley) who were eligible but for some reason refused to join.

The view that the New Zealand body should be formed, and that the time was ripe for its formation, steadily gained ground. A strong exponent of this view was Prof. H. G. Denham and in so far as any one person can properly be called the founder of the New Zealand Institute of Chemistry, Prof. Denham deserves that title.

By the end of 1929 it was clear, even to those who most feared the weakening effect on the British Institute of Chemistry that the New Zealand Institute of Chemistry was coming soon. Auckland had by that time quite a strong Chemical Society which had expressed its willingness to link up with the New Zealand Institute of Chemistry when it should be formed. (Incidentally this Auckland Society was probably the first local organization of chemists to be formed apart from internal bodies in University Colleges. As far as we know the nearest approach to anything of the kind had been a Technological Section of the Wellington Branch of the New Zealand Institute).

In was in these circumstances that the first Otago body, of that kind, the Otago Chemical Society, was formed at the end of 1929. Although there is no explicit statement to that effect in the written records it was the clear intention of the founders that the Society would affiliate with or become part of the New Zealand Institute of Chemistry immediately on the formation of that body and the formation of the Society was discussed on that basis at the preliminary meeting. As we shall see matters did not work out quite in that way.

The preliminary meeting was held at Otago University on September 18th, 1929. Invitations to it were by circular letter over the signatures of J. K. H. Inglis and R. Gardner, sent to all people known likely to be interested. Prof. Inglis made no secret of being in some doubt as to whether the Society would prove to be viable, but the tone of the first meeting made it clear that there was a decided need for something of the kind and the formation of a definite organisation was warranted.

Accordingly a committee was set up to draft rules, etc., and the Society came into being at a meeting held on 16th October, 1929. The first President was Prof. Inglis and R. Gardner was the first secretary.

Those present besides the late Prof. Inglis and the Hon. Secretary were:—H. A. Aitken (a younger brother of the mathematician—he afterwards went to England and died there), Geo. Bagley (now living in retirement at Lower Hutt, then with McLeod Bros., Ltd.), W. L. Barr (now with Forest Products Ltd., Auckland), W. G. Blackie (now Asst. Director of Agriculture, Fiji), C. L. Carter (still with us), J. K. Dixon (now of Soil Research Division, D.S.I.R.), H. J. Finlay (now dead after a remarkable career as a palaeontologist), G. Gilbert (still very much alive), K. W. Glasgow (now Headmaster of Scot's College, Wellington), J. C. Kirkaldie (then with Wilson Malt Extract Co.—he died a few years later), J. Melville (Grassland Division, D.S.I.R.), R. I. Nicholson (Senior Research Chemist, Colonial Sugar Company, Sydney). H. D. Purves (now at Medical School), C. C. Roberts (then on staff of Dunedin Technical College, now Inspector of Schools), P. Rouse (Manager of Kempthorne Prosser's Acid Factory, Burnside, since died), F. Saxton (then in practice in Dunedin as a consulting chemist), W. B. Seymour (since dead, then manager of K.P.'s Pharmaceutical factory), Peter Thompson (then with K.P.'s at Burnside now retired; Christchurch), J. Williams (then near the end of a long period of service as Science Teacher at O.B.H.S.), G. S. Thomson (then O.B.H.S.), L. H. James (now Assistant-Director, Dominion Laboratory), A. E. McGrath (now at Milburn Lime & Cement Co.). Apologies were received from H. G. Black (then Lecturer in Metallurgy at Otago School of Mines), J. Chilwell (Highlander Milk Factory, Southland); G. A. Holmes (now Director, Invermay Research Station) and P. W. Aitken (afterwards chem. engineer, Ravensbourne Acid Works. Contemporary with but not related to H. A. Aitken, he also died young).

The first Ordinary meeting was held on 19th March, 1930, and Prof. Inglis gave an address consisting of an account of conditions and some of his experiences in the Universities of New Zealand (Canterbury College), Edinburgh, Leipzig and London. At the second meeting the Hon. Secretary (then teaching at Dunedin Technical College), spoke on "Errors and approximations in Practical Work." The third meeting in May, 1930, was devoted to discussion in some detail of a draft circulated by Prof. Denham of a proposed constitution for a New Zealand Institute of Chemistry.

Monthly meetings during the winter months continued to be held under the auspices of the Otago Chemical Society until the end of 1935.

In the second year, 1931, R. Gardner was President and C. L. Carter became Hon. Secretary, a post which he retained throughout the rest of the life of the Society. Subsequent Presidents were P. Rouse, L. H. James, J. M. Butler (now of sales dept. at head office of Shell Oil, London) and W. B. Seymour.

The first meeting of the Otago Branch of the N.Z. Institute of Chemistry was held in 19th November, 1930, following the definite formation of the Institute in that year. Dr. R. Gardner was in the Chair, Mr. Carter acted as hon. sec. and Dr Inglis reported on the first meeting of the newly-formed Council of the N.Z.I.C., at which he had represented Otago. Others present were H. A. Aitken, K. W. Glasgow, R. I. Nicholson, J. K. Dixon, C. C. Roberts, G. A. Holmes, and G. M. Moir (now with Dairy Division, Dept. of Agriculture, Wallaceville). The President and Hon. Sec. of the Otago Chemical Society were appointed to the corresponding positions in the Branch, as was to be the custom for the following years, and Dr. Gardner was also appointed Delegate to Council.

The Otago Chemical Society now exhibited a curious reluctance to commit a graceful suicide as had been the original intention and there followed a period of four years in which the Society and the Branch existed side by side.

The reason for this was the rule of the Institute that persons eligible for Associateship could not become Local Members but must become Associates and pay the corresponding fees. In the circumstances of today this sounds a very inadequate reason for continuing the complications ensuing from the existence of the two bodies. However this was the period of the great economic depression and there were a number of young graduates to whom the amount of money involved meant more than the young people of today can readily realise. Prof. Inglis was adamant on the point—he would not agree to placing unemployed young graduates in the position of having to find the Associateship fees or cease attending meetings.

This caused no difficulty in practice. The Society and the Branch always elected the same officers. The ordinary meetings were meetings of the Society while the Branch, functioning mainly through its committee, confined its activities to business such as discussion of rules and election of members. The Annual Meeting of the Branch was always held immediately after the close of the Annual Meeting of the Society. The few members of the Society who were not in the Branch would go and see to the supper while the Branch held its meetings. In 1932 for instance the proceedings of the Annual Meeting of the Branch consist of a resolution "That the proceedings of the Annual General Meeting of the Otago Chemical Society be taken, *mutatis mutandis* as the proceedings of the Annual General Meeting of the Otago Branch of the New Zealand Institute of Chemistry." This was moved, seconded and carried unanimously and the entire meeting could not have taken as long as it would take the Secondary to write up the minutes.

The economic conditions that dictated this curious state of affairs gradually altered. At the end Prof. Inglis was a sick man and no longer taking any active part in affairs and there was a reluctance to do what he had been so much against doing. However, the Institute was now firmly established and there was no good reason for continuing the existence of the Society. When the Branch had the responsibility for holding the 1936 Conference of the Institute it was felt that the time had come to put an end to what had now become a farce.

According to the Minute Book the Society met as usual in August, 1935, and there is no suggestion of its winding up. These minutes were confirmed on September 18th, 1935, which must therefore have been the date of the final meeting—five years to the day from the preliminary meeting. At its meeting a month later the Branch accepted with thanks the funds of the Otago Chemical Society, elected G. Gilbert a Local Member, elected officers for 1936 with G. A. Holmes as Chairman and set up a Conference Committee consisting of Dr. Gardner (Convenor), and Messrs Seymour, Holmes, James, Gilbert and Carter.

From that time the ordinary meetings are meetings of the Branch. The Conference was duly organised and was quite successful. In August of that year the branch welcomed Prof. Soper and at the end of the year elected him Chairman.

At the end of 1938 Mr Carter gave up the secretaryship and was chairman for the following year with Mr M. V. B. King as secretary.

The early history of the branch as seen in 1952 can reasonably be considered as ending at that point.

NEWS AND NOTES.

At Council meeting on 26th February a resolution was passed authorising the establishment of an Overseas Visitors' Fund. The purpose of this fund is to enable the Institute to have sufficient funds set aside to be able to invite eminent people who are visiting either Australia or New Zealand, for some other reason, to extend their trip to include a short tour of New Zealand visiting Institute Branches and other places such as the University Colleges. The establishment of this fund will enable the Institute to extend these invitations without the need for the immediate approval by those various authorities who would participate in the visit, and who would ultimately contribute to the cost of the tour, and thereby it is hoped that the issuing of these invitations will be expedited to the general benefit.

In a letter to Dr. Annett, Professor Emeleus states:—"I have just come home from my trip and would like to take this early opportunity of thanking you and your colleagues in New Zealand for your very great kindness to me whilst I was with you. I enjoyed myself thoroughly both in New Zealand and in Australia; and I can only hope that the visit was as valuable to you all as to me."

Dr. A. T. Johns of Grasslands, Palmerston North, has been awarded a fellowship for advanced study and travel in the United States under the Dominion Civil Service Fellowship scheme. Having been to the States quite recently with the A.C.S. Yochinproj, Dr Johns should be able to get the full benefit of his Fellowship.

EIGHTH NEW ZEALAND SCIENCE CONGRESS

Preparations for the Congress, to be held at Auckland University College from May 17th-22nd, are well advanced. Those requiring accommodation should notify the Hon. General Secretaries, P.O. Box 9027, Auckland, S.E.1., promptly.

The chemical section "B" is being organised by Mr Geo. Lambert, with Dr H. Bloom, A.U.C., as secretary. Dr Askew is to give the Section B Chairman's Address, entitled "Biology and Trace Elements."

The following symposia having a chemical bias, have been arranged either by section B or related sections:—

- A1. Pleistocene and recent Chronology in New Zealand, including Radio-Carbon Dating.
- A2. Geothermal Developments.
- A3. The Solid State.
- B4. Trace Elements.
- B7. Aims and Values of Soil Analysis.
- B8. Insecticides.
- B20. Wood and Wood Products (excluding Timber).
- B22. Impact of Substitute Foods and Fibres on New Zealand's Primary Industries.

The following is a list of the General Meetings to be held during the Congress:—

Monday, 17th.—

Morning: Presidential Address—Dr W. R. B. Olliver.

Evening: Conversazione at the Museum.

Tuesday, 18th.—

Evening: At the Town Hall. Speaker: Professor L. M. Oliphant, F.R.S., of Canberra.

Thursday, 20th.—

Buffet luncheon organised by the New Zealand Association of Scientists.

Evening: At the Seddon Memorial Technical College. Speaker: Dr R. N. Robertson, of Sydney, will speak on "The Struggle Against Equilibrium—A Physico-chemical Problem in Life."

Friday, 21st.—

3.45 p.m. General discussion on the Organisation of Science in New Zealand.

5.00 p.m. Sherry Party in the Women's Common Room, A.U.C.

8.00 p.m. At the College Hall. Speaker: Professor H. E. Odell, of Dunedin, will speak on "Geology and Geography in the Exploration of the Himalayas."

Local and general excursions of wide interest are being arranged.

DR. R. W. GREEN.

Mr. R. W. Green, senior lecturer in chemistry at the University of Malaya, Singapore, has been notified that he is to receive the degree of Doctor of Science from the University of New Zealand in recognition of his published research work on the chemistry of protein fibres.

Mr. Green was educated at the Auckland Grammar School and Auckland University College, where he graduated with first-class honours in chemistry. After some years as an industrial chemist in Auckland, he took up an appointment at Otago University under the Medical Research Council of New Zealand. There he investigated chemical problems connected with dental caries until he left Dunedin in 1950 to take up his present post.

BOOK REVIEWS.

ION EXCHANGERS IN ANALYTICAL CHEMISTRY. By Olaf Samuelson (Chalmers Institute of Technology, Goteborg, Sweden), 291 pages, 1953: John Wiley and Sons, New York, 6.50dol. The great value of this book is the realisation of the extensive possibilities of ion exchange in analytical chemistry. Prof. Samuelson is eminently qualified to write this review because of the many contributions he has himself made to this field. After an introduction on the nature and technique of using the resins, their applications in the various branches of analysis, both organic and inorganic, are dealt with and some details given of actual procedures. The book is well-referenced and has author and subject indexes. It is interesting to note that ion exchange may be used also for the purification of reagents, e.g., the removal of aldehydes from alcohol. The reviewer suggests a place for this book in every analytical laboratory, where it should be consulted before a new method of analysis should be accepted in any field.

ORGANIC SYNTHESSES, Vol. 33 (1953: John Wiley, New York, 3.50dol) brings together another forty reliable preparations in this well-known standard work. The method of setting out these syntheses with full directions, notes, warnings and literature references can hardly be bettered and it is interesting to see some of its principles being adopted by textbooks of practical organic chemistry.

CARATERISTIQUES DES CORPS CHIMIQUES PURS ET TECHNIQUES, May, 1953. Dunod, Editeur, 92, Rue Bonaparte, Paris. Subscription price per annum (12 issues), 10.000fr. Each monthly issue of this series contains twenty stiff paper cards 21 x 27cm. on which are listed the properties of twenty compounds, organic and inorganic. The cards are perforated all round so that they fit into any loose-leaf or punched-card system. Both physical and chemical data are given as well as sources of supply, uses and economic data. The information seems accurate and fairly complete. No references are given, and the names of the compilers are not stated. So far about 500 compounds have been dealt with and at the rate of 240 a year it will take a long time before a really significant proportion of the better known and more useful chemical individuals are covered. In fact it will hardly cope with the natural increase of commercially available chemicals. Nevertheless this is a very interesting attempt to place chemical data at one's fingertips.

FIAT REVIEW OF GERMAN SCIENCE 1939-46. (In German) Vols. 34 and 35: Theoretical Organic Chemistry, Parts I and II. DM 10 ea. Vols. 37 and 38 Practical Organic Chemistry, Parts II and III. DM. 20ea. Berlin, 1953: Verlag Chemie. These volumes have been so long delayed in publication that the latest researches discussed are over seven years old but they gain by being written by some of the leading authorities. Notable contributions are Alder's article on the diene synthesis in Vol. 37, Staudinger on cellulose, and the very considerable portions of Vols. 34 and

35 by Walter Hueckel. The section on automatic micro methods of elementary analysis of organic compounds (Zimmermann—Vol. 37) and a very long article by Jayme on cellulose fibre pays tribute to the very extensive researches along these lines in Germany in the period under review. The section on synthetic rubber reveals little that is new but there is a very interesting article on polyurethanes by Bayer in Vol. 38.

INORGANIC SYNTHESSES, VOL. IV. Editor-in-Chief John C. Bailar, Jr. 218 pages. New York and London. McGraw Hill Book Co. Inc., 1953, 36/-. The appearance of the fourth volume of this excellent series will be readily welcomed. The new volume maintains the high standard of presentation and layout that were a feature of the former volumes in this series, and can be unreservedly recommended to all chemists interested in inorganic chemistry.

A feature of this volume is the methods of preparation of anhydrous halides and the preparation of the non-polar fluorides including a useful review of methods of fluorination. The preparations include phosphorus acid and organo-phosphites, addition compounds of Chromium (VI.) oxide and Acidopentamminecobalt (III) salts.

In common with other volumes in this series it may be said that there is something for everyone in this volume, and every chemist should find in the experimental sections some useful hints applicable to his own particular problem. It is most gratifying to learn that the volumes in this series are to appear more frequently for their usefulness is well known. —W.J.W.

RICHMOND'S DAIRY CHEMISTRY, FIFTH EDITION, revised by J. G. Davis and F. J. Macdonald, pp.603 London; Charles Griffin and Co. Ltd., 1953. Price 60/-. This revision of Richmond's text-book and laboratory manual is based on the fourth edition but, although much of the previous edition has been reproduced without change, there has been included nearly 100 pages of new material covering recent developments in dairy chemistry. This new material which includes references as late as 1952 describes such things as the apparent trend to lower S.n.F and the latest reports on freezing point variation. There is a new section on pH and other physical characteristics. The dried milk powder section has been amplified in line with its increased production and use over the last decade but it is unfortunate that problems in analysis arising from the use of reconstituted milk for balancing purposes in the winter liquid milk industry have not been discussed. The effect of heat in reducing the viscosity of cream and methods for overcoming this other than by using additives (a prohibited practice in most countries), is a problem which is faced by every market-milk chemist yet it has received scant attention although it is likely to be a matter of considerable importance with the increasing availability of table cream. Mr. Macdonald in his revision of the analytical section has very wisely adopted the various standardised procedures, in preference to the methods given in the previous edition, although in effect the changes in methods are not great. The book is extremely well printed and bound and being written in a readable not over technical style can be recommended to factory managers and technicians as well as to dairy chemists and analysts. —G.M.W.

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