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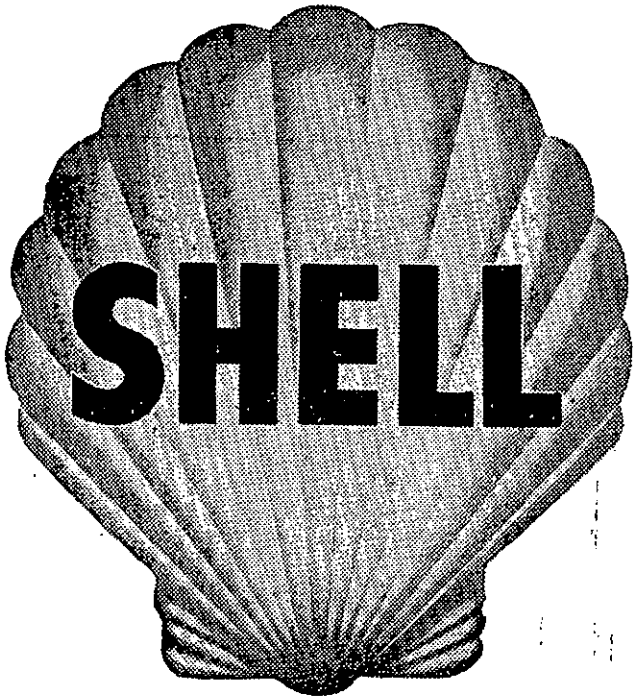
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## EDITORIAL

With this issue the Journal of the New Zealand Institute of Chemistry is under new leadership and some changes may be evident to the least observant of our readers. Our first duty and privilege is to pay a tribute to Dr. H. E. Parton for the excellent service rendered to the Institute over a period of eight years. Dr. Parton took over the Journal at a difficult time; the finances of the Institute were such that there was little to spare for the Journal and publication had been allowed to fall behind. Dr. Parton is a modest man—it was over a year before we discovered he has been raised to the dignity of Associate Professor—and he tackled the Journal in a modest way befitting the official organ of a small body such as we were then. He did the whole job himself, being his own publisher, despatcher, business manager, and reader, and in all eight years the Journal was always published to time. This is an achievement over a period of war and uncertainty, which few other editors of chemical publications could claim; even the American Chemical Society, with its breath-taking resources, has had its difficulties; others are months behind. Dr. Parton has therefore done well and has firmly established our Journal, thus earning the thanks of all our readers.

The time has come for a change and with the larger membership and finance of the Institute of to-day, the Journal should become a larger and more ambitious publication. It will in future be handled by a committee rather than one man, and some changes of policy may be evident. Comments will be welcome whether of praise or blame: the dying editor of the Western paper after being shot by an irate reader at least had the satisfaction of knowing that his paper was being read. We would remind our readers however, that the correspond-

ence columns are always open to them, and are from our point of view a more satisfactory way of venting their displeasure. We now launch ourselves on the sea of words: like Columbus, we may not know where we are going, and when we finish the voyage we may even be in error as to where we have been, but at the least the travelling should be interesting.

### **SIR REGINALD STRADLING'S REPORT:**

The report of Sir Reginald Stradling which was featured in the press in January, was primarily concerned with the building industry, but it raised one point of considerable interest to all scientists in the suggested establishment of building research institutes which are to be under the general authority of the Council for Scientific Research, but not part of a Government department. Rather, Sir Reginald feels, they should be attached to the Universities and should be on a budget for total expenditure and not held down to an irritating detailed accountancy. Such a policy is not altogether new in New Zealand, but the great bulk of scientific research is firmly in the hands of the Departments of Scientific and Industrial Research and Agriculture. The majority of research workers are civil servants and their conditions of employment are such that they have not the incentive to give of their best. As the "Auckland Star" of January 20th pointed out, their salaries cannot be greatly increased or their conditions improved without exposing the authorities to considerable pressure from non-scientific personnel who fail to appreciate the special nature of research work or the special training required.

It would appear that the application of Sir Reginald's thesis to the various branches of applied research where chemistry is concerned has much to commend it. The proximity of "pure" and "applied" research workers at the Universities should produce an exchange of views and mutual discussion that can hardly fail to be productive in all three fields of teaching, "pure," and "applied" research. In fact we dislike the terms: "long range" and "short range" as applied to research and would emphasise the fact now becoming so patent that there can hardly be any research which will not ultimately have some application either in medicine or the arts. The present organisation of research in New Zealand tends to emphasise the difference between them where it may be wiser to accentuate their common heritage. The establishment of research institutes at the Universities would result in a combination of equipment and library facilities which would widen

the scope and availability of both—a point of some importance when research is becoming dependent on increasingly expensive instruments and publications. It would also lessen the feeling of frustration mentioned by Sir Reginald as being felt by some research workers over the existence in the Dominion of equipment which would be of considerable value to them in their research, but is unavailable. The fact that students would have an opportunity of knowing the research problems having an immediate bearing on our national economy should not be overlooked: it may help to stem the oft-regretted flow of our best brains overseas. The research workers in the Institutes may also uncover by-paths which time does not permit them to explore, but which may well prove fruitful fields for research for Honours and Ph.D. candidates if not for the University staff. Sir Reginald Stradling's report is one of the best we have had in the Dominion from an overseas scientist and its full implementation by the Government may well herald a new day for scientific research in this country.

### SCIENCE AND THE PUBLIC

Hon. T. H. McCombs, M.Sc., A.R.I.C., A.N.Z.I.C., M.P.,  
Minister of Education and Minister of Scientific  
and Industrial Research.

One point that has struck me most forcibly since I left the strictly scientific world is how little the public know of work done in the laboratories of this country. Not only does that remark apply to the general public, but applies also to those who could be regarded as the consumers of the knowledge produced in these laboratories or as the users of the skills which scientists have worked out. The general public regard science somewhat in the light of their reading of advertisements showing the bearded scientist at a microscope, and seeing the romanticised work of scientists in the films, and they very often regard the scientist as a "one man brains trust" who can provide them with the answers to anything straight off the reel without any laborious and painstaking research as a preliminary.

Occasionally the newspapers of this country carry articles on scientific work and not so long ago one metropolitan newspaper ran a series of articles on the Cawthron Institute, which did a very great deal towards giving the public in the town where the newspaper was published a much better appreciation of the work which has been done at the Cawthron Institute. Everyone, I think, will agree that this Institute has done a very

great deal for the people of New Zealand, and particularly the Nelson Province, but much very valuable scientific work, as we all know, has been done elsewhere.

There is undoubtedly a need for understanding by the public of the requirements of scientists if they are to turn out really first-class work. The scientist must be given a suitable environment, the equipment necessary for the particular investigation that is in hand, and last but not least sufficient income to allow him to do all his worrying about his scientific problems and not about his family affairs. When both the employer and the public generally appreciate these points and see that the scientist has conditions suitable for his work, I am convinced that work of even greater value to this country will be turned out by our many very well qualified scientific workers.

Not only do the public need to know these points which I have mentioned, but we need to tell our school children something more about possible careers in scientific work. At least two pamphlets have been circulated in our schools showing the work of scientific institutions and these have been of great assistance to pupils in deciding their future careers. At the present time, a committee, consisting of representatives of the Departments of Agriculture, Education, Labour and Employment, and Treasury, the Council of Scientific and Industrial Research, the Manufacturers' Research Committee, the New Zealand Dairy Board, the University, and the New Zealand Association of Scientific Workers, is investigating scientific manpower problems in order to determine what our future requirements of scientific workers will be and what we should do to obtain the numbers of workers we require in each category. This committee will have to determine also how school pupils are to be advised as to their future careers and good potential workers are to be persuaded to take up a career in one or other of our laboratories.

I have no doubt that some first-class workers, are lost to science because of family circumstances; because their parents' income is such that the youth must go to work to supplement the family income. The Science Course at the University has increasingly become one for a full-time student. The Education Department has found it necessary to institute a system of bursaries to ensure that a sufficient supply of secondary school teachers will be available in the future. It may very well be that a similar device will be necessary to ensure that these potential workers I have referred to are not lost to science.

Not only have the public to obtain a greater appreciation of the needs of the scientist but the scientist himself also, in many cases, does not appreciate that he himself is a part of the community and has a responsibility to that community. Modern science can fairly be said to have built modern civilisation. Without the chemist, physicist, and the other scientific workers, the technical advances of to-day would have been impossible. The contribution of scientific workers in this country to the welfare of the country as a whole has been very great and the present standard of living here would be impossible if that work had not been carried out. The public need to be advised by the scientist of the potentialities of his discoveries. Some people are saying that the scientist is in danger of destroying the civilisation he has made, of throwing his child into the "brazen jaws of Moloch" where it will be consumed by the atomic fires he has created. I am convinced that this disaster can be avoided if the public as a whole, including the scientist, realise the responsibilities which are placed on them by the discovery of these enormous powers. We, here in New Zealand, have but touched the fringe of this but nevertheless public opinion is important and the scientist should take every opportunity of keeping the public informed of what he has achieved and its implications for good and evil.

I am looking forward to a period of expansion in scientific work in New Zealand and I am afraid that it will not be possible to make it as rapid as I would like because of the difficulties not only of obtaining buildings but of obtaining the scientific workers to do the work that is crying out to be done. I hope that during my term of office it will be possible to achieve some of this expansion and to begin work which is urgently necessary to the future of this country.

### OUR NEW PRESIDENT



Dr. J. K. Dixon, M.Sc., Ph.D., D.I.C., F.R.I.C., F.N.Z.I.C., brings to the highest office of the Institute a record of fine service to the interests of New Zealand chemists, and indeed to the wider field of scientists generally. Since he went to Wellington in 1940 as Chief Chemist in what is now the Soil Bureau, he has been very closely identified with all activities directed toward the betterment of conditions for scientific workers, both those of established position, and those who are seeking to qualify themselves. He has served the Wellington Branch as Chair-

man in 1942, and the Council, in which his work on important standing committees has been of special value. His interests have not, however, been confined to the New Zealand Institute of Chemistry as he has been equally active in the New Zealand branch of the Royal Institute of Chemistry and the Wellington Branch of the Royal Society of New Zealand. He has been one of the most important co-ordinating factors in recent conferences where these bodies have co-operated

Dr. Dixon turned to chemistry as his main interest while at Christchurch Boys' High School, and quickly made his mark at Canterbury College in his chosen field. He graduated at a time when the demand for chemists was, at best, only fair. After a year's post-graduate work on the pH of wheat extract, he went to Otago as John Edmond Fellow and then to London to study agricultural chemistry under A. F. Pollard at Imperial College. A short experience of University teaching at Otago followed, during the illness of Professor Inglis, and then Dr. Dixon began the work with which he has since been identified on the many problems of soils. First as soil chemist at the Cawthron Institute, and then in Wellington in charge of the soil chemical work, he has contributed extensively to the growth of knowledge and understanding of the basic problems upon the solution of which our economic welfare primarily

depends. The growth of the laboratory and the variety of the methods it now applies, is a measure of the broad grasp of his field which Dr. Dixon possesses. Success in applied research depends equally on the capacity of the research directors, who must design the strategy and guide the tactics, and the ability and enthusiasm of the assistants. Only first-class direction will hold and inspire the research workers New Zealand needs. Soil chemistry has been well served in the past, and is equally well served to-day.

With a Pan Pacific Congress in the offing next year, 1948 is an important year for New Zealand Science, and the Institute will be represented by a President well-equipped as a chemist and as an administrator.

### CRYSTAL CHEMISTRY

Professor F. J. Llewellyn.

A lecture delivered to the Auckland Branch at its November meeting.

X-ray crystallographic studies have gone far in the elucidation of structures of both inorganic and organic substances in the solid state. It is possible to determine with considerable accuracy the size and shape of molecules and from a knowledge of the interatomic distances to deduce the kind of chemical linkage. Nevertheless it must be emphasised that the evidence concerning the precise nature of a chemical bond is that of distance and disposition only. Other physical methods such as infra red spectroscopy, magnetic measurements, and the like, can provide valuable corroborative information such that in the ideal all these methods of attack become complementary.

In most structural work the X-radiation used is the characteristic  $K_{\alpha}$  line in the copper spectrum; the wave length is  $1.539 \times 10^{-8}$  cm. The intensity of the  $K_{\beta}$  radiation which is excited simultaneously is reduced by passage of the beam of X-rays through a thin piece of nickel foil. For most purposes the emergent beam can be treated as a monochromatic radiation. In some circumstances however, e.g., in the examination of natural fibres and artificially produced high polymers, it is necessary to use a much more completely monochromatised beam; under these conditions the original beam from the X-ray tube is allowed to fall on to a crystal of pentaerythritol or other suitable substance so orientated that only the  $K_{\alpha}$  wave length suffers diffraction; the diffracted beam is then utilised as the incident radiation for subsequent diffractions.

In 1915, Bragg evolved the well-known law for the diffraction of X-rays by crystalline matter viz:  $n\lambda = 2d \sin \phi$  where  $\lambda$  is the wave length of the X-radiation,  $d$  the spacing of the crystal planes, and  $\phi$  the angle between the incident beam and the crystal planes whose spacing is  $d$ . This law does not represent a complete statement of the conditions of diffraction since it implies that diffraction by means of a three dimensional grating is equivalent to a reflection. Bragg's law is directly applicable if it is remembered that the incident and emergent angles are always equal.

The course of a structural determination is divided into two well defined phases. Firstly the directions of the diffracted beams of X-rays is determined from the positions of the photographic spots produced on a suitably arranged photographic film. From these positions it is possible to determine  $\phi$ , and with a knowledge of the wave length of the X-rays used,  $d$ , the spacing of the crystallographic planes is calculable. This information is usually summarised in a statement of the unit cell dimensions, i.e. the spacings along three axes which are mutually perpendicular or as nearly so as the symmetry of the crystalline arrangement permits. Secondly, the orientation of the molecule is determinable from intensity of the diffracted beams from the various crystallographic planes and these intensities are obtained by measuring the density of the photographic images. The operations in the first phase can be systematised because there is a finite number of patterns upon which any structure can be built; the operations of the second phase are necessarily more complex and less predictable since each atomic arrangement which defines the structure of a substance is unique.

X-ray crystallography has proved invaluable in the elucidation of problems of hydrogen bonding and resonance in organic substances. The benzene ring in benzene itself and in substituted benzenoid substances has been shown to be a regular hexagon, thus demonstrating directly the validity of the Kekulé formula. Resonance in such groupings as  $R-NO_2$  has been established by the equivalence of the two oxygen atoms; each is separated from the nitrogen atom by a distance intermediate between the single and double bond lengths determined in other substances.

The function of hydrogen in carboxy acids and in alcohols has been examined in considerable detail. In substances like acetic acid two molecules are held together by means of a

hydrogen bond; the strength of this bond is sufficient to ensure the existence of the dimer even in the vapour state. The structure may be written as in figure I.

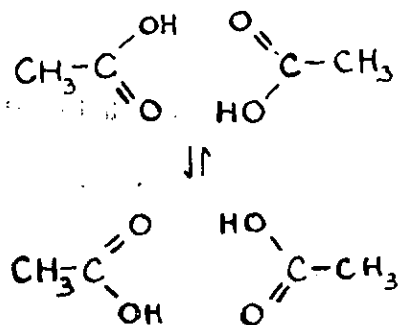


Fig. I

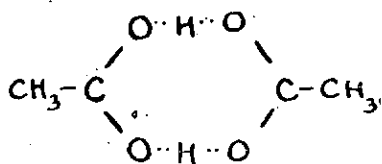


Fig. II

Since however, the electronic rearrangement takes place so rapidly that the nuclei cannot follow, the actual structure is a compromise between these two extremes and can be represented by figure II.

All four C-O separations are equivalent and intermediate between the accepted single and double bond distances. In alcoholic substances the conditions of hydrogen bonding are different. In the grouping  $\text{-C-OH}$ , the hydrogen atom has a pronounced effect upon the symmetry of the electronic field of the oxygen atom such that it develops local concentrations of negative and positive charges. Two hydroxyl groups in neighbouring molecules will therefore attract one another by the juxtaposition of two charges of opposite sign. Thus in pentaerythritol  $\text{C(CH}_2\text{OH)}$ , the distances between the hydroxyl groups in neighbouring molecules is  $2.69\text{\AA}$ , about  $1\text{\AA}$  less than the normal distance between atoms which are not chemically linked. Crystals of alcoholic substances in which there is extensive hydrogen bonding are usually hard and have high melting points (vide carbohydrates).

Latterly the technique of crystallographic investigations has progressed rapidly so that in some circumstances it can vie with classical chemical methods in the elucidation of the structure of new organic compounds. Penicillin, which was examined by both these methods in extensive researches in England in the war years, finally succumbed to the searching tactics of the X-ray crystallographer.

**RESEARCHES ON FATS AND RELATED CONSTITUENTS  
BY NEW ZEALAND WORKERS**

A REVIEW—PART I.

F. B. Shorland

Fats Research Laboratory, Dept. of Scientific and Industrial  
Research, Wellington.

The dependence of New Zealand on fats can hardly be overstressed, since either directly, in the form of butter, tallow, fish liver, whale oil, or, indirectly, as the major part of the dry matter of the bone and tendon free lamb, mutton and beef carcasses, \* fats comprise the bulk of our export trade.

Beyond the trace amounts required to furnish the group of unsaturated acids which have come to be known as the essential fatty acids, fats *per se* may be replaced in the diet by carbohydrates and proteins. Nevertheless, because of their high calorific value, it is generally considered desirable, wherever possible, that the fats should form not less than 20 to 25 per cent. of the total calories in the diet. Another important consideration is the value of fats as carriers of vitamins A, D and E. Other significant factors are the sparing action of food fats on the vitamin B complex, and the satiety value of dietary fat. The importance of fats in the manufacture of soaps, paints, lubricants, leather, rubber, illuminants, etc., does not require elaboration.

Until recently, the subject of fats has not, perhaps, received the attention which has been accorded to other groups of naturally occurring compounds, such as proteins, carbohydrates, alkaloids and essential oils. This, I think, has been due partly to the use of constants such as the saponification and iodine values for the study of fats † in place of the more fundamental methods involving ester fractionation analyses and glyceride structure determination. This approach has led to the development of inadequate and false hypotheses, such as the popular "desaturation" theory of Leathes<sup>1</sup> whereby

\* Bone and tendon free carcasses of lamb and mutton, for example, contain 30-40% fat, 15% protein, and 45-55% water.

† This does not mean, however, that such constants are not extremely useful in providing a background for indicating similarities and differences between fats, so that more effective use can subsequently be made of the more fundamental procedures.

the liver was stated to desaturate food and depot fats, and Callow's<sup>2</sup> growth rate theory of iodine value which sought to explain the variations in the iodine value of the fats in various parts of animals by the relative rate of growth of the fatty tissues.

The thoughtless and uncritical perpetuation of incorrect information and oversimplification in respect of fatty substances in standard University text books, have tended to retard progress. For example, in "A Class Book on Organic Chemistry," Part I, by J. B. Cohen, 1938, which is generally excellent, we find on page 118—"The glycerides as they occur in fat, are known as stearin and palmitin (75 per cent) which are solids, and olein (25 per cent.), which is liquid at the ordinary temperature . . ." "These substances are, however, not confined to the animal fats. Palmitin is the chief constituent of palm oil, olein of olive oil, of which it constitutes 75 per cent., whilst stearin is frequently found in animal and vegetable oils." Nothing could be further from the truth than these statements. Very few natural fats contain less than three fatty acids; more usually, 5, 6 or 7 such acids are present, and this number may often be much exceeded. The general tendency to produce, as it were, as little of simple triglycerides (containing three molecules of the same fatty acid) as possible, and to concentrate on the production of molecules of mixed triglycerides is extremely marked throughout the whole range of natural fats.<sup>3</sup> It is thus very doubtful if appreciable amounts of the glycerides mentioned in Cohen, could be found in natural fats. Cohen further states, "Butter and cocoa-nut oil contain in addition to the above, butyrin, the glyceride of butyric acid." It is true that butterfat contains approximately 9 mols. per cent. of butyric acid, but from the law of even distribution, the occurrence of tributyrin is excluded. In respect of cocoanut oil, the literature does not record the presence of any butyric acid in this fat. In this instance, the reported presence of tributyrin is a figment of the imagination.

In the presidential address at Liverpool to the Society of Chemical Industry of Great Britain, in 1924, E. F. Armstrong<sup>4</sup> under the appropriate title of "A Neglected Chapter in Chemistry—The Fats," collected together the relevant facts concerning the chemistry of fats, and ascribed the lack of study in this field as almost entirely due "to the considerable experimental difficulties which confront the worker, and to the need for making a mass attack on the subject by the whole staff of a research school during a number of years, before any measure of success can be obtained." These words were spoken preceding the appointment of T. P. Hilditch, D.Sc. F.R.I.C.,

F.R.S., as Campbell Brown, Professor of Industrial Chemistry at the University of Liverpool for the purpose of studying Oils, Fats and Waxes. Now, thanks largely to the development of satisfactory methods for glyceride structure and for fatty acid composition by this school, it may be claimed, in the words of Hilditch<sup>5</sup>—"That our knowledge of the subject is fully abreast of that of other important groups of natural products."

Perhaps even more stimulating than the development of methods has been Hilditch's biological approach to the subject of fats, which is epitomised in a paper on "The Evolution of Natural Fats," published in 1936, with J. A. Lovern<sup>6</sup>. This paper illustrated that consistent and well-defined changes in biochemical as well as in biological conditions have accompanied evolutionary development in nature.

The field of fats has now so extended, that to write a complete story even within the scope of the present title would require more than the allocated space, and, it is therefore the intention of the writer to emphasise to some extent those aspects with which he has had personal experience. It should, however, be stressed that there are other spheres of activity in fats research in New Zealand of considerable importance, particularly in connection with the technology of butter manufacture. The work of the Dairy Research Institute, Palmerston North, could in this connection alone well form the subject of a separate review.

### **ANIMAL FATS**

Published work on the depot fats of New Zealand sheep and oxen is rather scanty. The fact that these fats are used locally, however, in the margarine, stearic acid and other industries, probably signifies that there may be within these industries some knowledge of the products which they handle. It is known, for example, that S. G. Brooker<sup>7</sup>, Chief Chemist, Abels Ltd., is conducting researches on the hydrogenation of fats, glyceride structure, fatty acid composition, antioxidants and other lines which have already contributed materially to the efficiency of the margarine industry. In connection with the technology of tallow manufacture, Lawrence<sup>8</sup> found that medium and highly coloured products could be bleached by agitation at 90-110°C. with 3.7% of Fuller's earth from Whangarei, followed by filtration under appropriate conditions.

### Sheep Depot Fats

McMeekan and Clarke<sup>9</sup> determined by dissection, the bone, muscle and fat contents of carcasses of export grades of New Zealand lamb and mutton. Basing their results on 30 carcasses per grade for lamb and 20 carcasses per grade for mutton, they found that as the weight of the carcass increased from a mean value of approximately 30 lbs. to a mean value of approximately 77 lbs. the bone, muscle and fat content increased respectively by approximately 80%, 100% and 240%. In view of the greater nutritive (calorific) value of the heavier grade of mutton as compared with lamb, the export of lamb may be questioned. The dissected muscle and fat tissues from the joints used in connection with the preceding investigation, and comprising neck, shoulder, thorax, loin, legs and pelvis, were examined by Shorland, de la Mare, Sorrell and Barnicoat<sup>10</sup> for fat, protein and water content. It was found that the following equations connecting the percentage fat (F), percentage water (W) and the percentage protein (P) satisfied the results both for the separate joints and for the total carcass, with a standard error of estimate of protein from fat of 0.37 per cent.

$$W = 78.08 - 0.790 F \dots\dots\dots (1)$$

$$P = 21.92 - 0.210 F \dots\dots\dots (2)$$

These equations are very similar to those reported by Callow<sup>11</sup> for British and American beef. The fat contents of the thorax, loin, pelvis and shoulder, were found to be highly correlated with the fat content of the carcass, and could be used to give a satisfactory estimate of the carcass composition. For example, the percentage fat in the carcass F may be calculated from the percentage fat in the thorax t as follows:

$$F = 0.900t - 3.99 (r = 0.992) \dots\dots\dots (3)$$

The fats from the dissected muscle and fatty tissues were separately bulked to give composite samples for ester fractionation analyses<sup>12</sup> shown below:

#### Fatty Acids—Weight Per Cent.

|   | Saturated |     |      |      |     | Unsaturated   |               |                |               |
|---|-----------|-----|------|------|-----|---------------|---------------|----------------|---------------|
|   | C12       | C14 | C16  | C18  | C20 | C14           | C16           | C18            | C20           |
| Fats from fatty tissues                           | 1.3       | 3.5 | 25.0 | 22.2 | 0.7 | 0.5<br>(2.0H) | 1.7<br>(2.0H) | 44.2<br>(2.1H) | 0.9<br>(2.0H) |
| Fats from muscle tissues (excluding phosphatides) | 0.2       | 4.1 | 24.6 | 15.4 | 0.7 | 0.5<br>(2.0H) | 2.6<br>(2.0H) | 50.1<br>(2.2H) | 1.8<br>(4.5H) |

The above values fall within the range found by Hilditch and Pedely<sup>13</sup> for the external tissue fats of ewes fed on varying planes of nutrition. These workers do not give the mean unsaturation of the C20-22 unsaturated acids, which would be of interest, since the work now recorded suggests that the muscle tissue fat, although generally similar to the fat from the fatty tissues, nevertheless, tends to contain more of the highly unsaturated acids.

### Liver Fats of Farm Animals

While the depot fats of these animals comprise chiefly glycerides containing palmitic, stearic and oleic acids, the liver fats are more complex in respect of their fatty acid composition, and, in addition, contain much greater proportions of phosphatides, cholesterol and cholesteryl esters than are found in the depot fats.

Hilditch and Shorland<sup>14</sup> examined the liver lipids of ox, cow, pig and sheep, using selected prime animals, except in the case of the cow, where only one liver showing fatty degeneration was used.

Apart from the presence of somewhat greater proportions of hexadecenoic acid (5-10 mols. per cent.) and of C20-C22 highly unsaturated acids (5-15 mols. per cent.) the liver glycerides were shown to resemble the corresponding depot fats. The fatty acid compositions of the liver phosphatides, were readily differentiated from the corresponding liver glycerides by the presence of increased proportions of C20-C22 highly unsaturated acids and stearic acid together with diminished proportions of hexadecenoic acid. In the case of the sheep liver lipids, however, an anomaly was observed in that the phosphatide fraction contained more hexadecenoic acid than the glyceride. Unpublished observations by Collins, de la Mare and Shorland<sup>15</sup> on many liver lipids from normal sheep as well as from sheep suffering from pregnancy toxæmia, congenital photosensitivity, and sheep with liver damage arising from facial eczema, generally confirmed the observations made by Hilditch and Shorland. However, in respect of the relative amounts of hexadecenoic acid in the glyceride and phosphatide fractions, it was found in spite of the earlier anomalous result, that the sheep liver lipids fell into line with the lipids of the other animals examined. It was also established that the lipids of normal sheep livers preserved in boiling alcohol immediately after killing, contained little free fatty acid. The iodine value and composition of the free fatty acids of poorly preserved livers resembled that of the glyceride fatty acids.

In one case, the amount of free fatty acid present was so great that to judge from the normal phosphatide content not more than half of the free fatty acids could have been derived from the phosphatide fractions. These facts suggest that contrary to current opinions <sup>16</sup> phosphatides are by no means the only source of fatty acids produced during the autolysis of tissues.

Although the lipid content of the livers varied from 4.1 to 32.9% the glyceride and phosphatide fractions showed little variation in fatty acid composition. For the glyceride fractions the ratio of palmitic to stearic acid was 2:1 and compared with 2:3 observed for the phosphatide fractions. Analyses of 21 samples of livers (normal and diseased sheep), showed the following range of values:

| % Wet Tissue |                                 |                                 |             |   |
|--------------|---------------------------------|---------------------------------|-------------|---|
| Total Lipid  | Glycerides<br>(Acetone Soluble) | Phosphatides<br>(Acetone Insol) | Cholesterol | Remainder of<br>Unsaponifiable<br>matter. |
| 4.1 — 32.9   | 0.14 — 25.5                     | 2.9 — 4.4                       | 0.15 — 0.50 | 0.04 — 0.24                               |

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**COAL AS A SOURCE OF ENERGY IN NEW ZEALAND**

W. A. JOINER

(Notes from an address delivered to the Auckland Branch by the President, New Zealand Section, Royal Institute of Chemistry, 30th September, 1947.)

Mr. Joiner, President of the N.Z. Branch of the Royal Institute of Chemistry and Director of the Dominion Laboratory has had a life-long association with coal research in N.Z. In surveying New Zealand's energy resources, Mr. Joiner stated that these could be divided into two classes, namely permanent resources and wasting resources. The most important permanent source of energy in this country is that derived from the movement of inland waters, and if it were not for our hydro-electric resources the outlook for the future would be grim. It has been estimated that in the North Island the possible maximum hydro-electric power resources amount to about  $1\frac{1}{2}$  million kilowatts, and in the South Island to about five times this figure. Wind power might be a possible economic adjunct to water power in the future. It was suggested that one would no doubt take more kindly to the breezes that blow about Cook Strait if one knew that some use was being made of them. Of the wasting resources of energy in N.Z., the only one of importance is coal. How dependent we are on coal as a source of energy is shown by the fact that over 70% of our energy requirements come from this source. It is obvious therefore, that we must look to coal as a source of energy for a long time to come, until hydro-electricity is developed to a much greater extent or until atomic energy has become a practical substitute.

It was with some realization of the position that the Coal Survey was commenced in 1936 for the purpose of taking stock of our resources. Prior to that time various geological estimates of coal had been made, but since these did not take into consideration the practicability of mining, economics or the properties of the coal, they did not provide reliable information as to our useable coal resources. This has led to the belief that our available coal resources are much larger than they really are.

The Coal Survey is a combined effort of the Mines Department, the Geological Survey and the Dominion Laboratory Divisions of the Department of Scientific and Industrial Research. The geologists work in close collaboration with officers of the Mines Department in the field. The Fuel Section, Dominion Laboratory, is concerned with the examination and analysis of coals, survey records and matters connected with

the technology of coal utilization. Accurate collection of samples is of course extremely important. Complete portable kits containing pick, hammer, mortar and air-tight sample containers are supplied to the field officers. Laboratory analysis include determination of the so-called "fixed carbon" and "volatile matter" ratio, moisture, ash and sulphur content, coking properties, calorific value and fusion or softening temperature of the ash for clinker formation.

Coals in this country are of three main types (a) bituminous (b) sub-bituminous (c) lignites.

Bituminous coals are those black coals with low inherent moisture content and which yield coke when heated. These coals have a high calorific value and from this point of view are desirable as boiler fuels and it is on such coals that the gas industry largely depends. Resources of bituminous coals exist in the Greymouth and Westport coal fields. It was these fields which were the first to be tackled systematically by the Survey. Mr. Joiner was pleased to say that the detailed survey of the Greymouth area has been completed and that the very comprehensive report dealing with all aspects of this work is now in the press.

Sub-bituminous coals are non-coking, have a higher inherent moisture content than bituminous coals and a lower calorific value. These coals are much in demand as a domestic fuel and for steam raising purposes both for railways and industry. These coals are not suitable by themselves for use in conventional gas-making plants, but are however frequently used in blend with bituminous coal for this purpose. The main deposits of sub-bituminous coal occur in the Waikato field, in Southland and in North Auckland. Much is already known about the Waikato Coal-field, but it is considered that a thorough survey should be made here as soon as possible.

Lignites occur extensively in parts of Southland and Otago and in Canterbury. These coals have a high inherent moisture content varying from 20 - 40%. As mined the moisture content may be considerably higher. Lignites are usually brown in colour and as the name implies show evidence of a woody structure and the remains of vegetation. Reconnaissance surveys have been made of the lignite deposits in Southland, to the north of Kaitangata and of a small deposit near Westport. Survey work in general has been impeded by the war and a shortage of staff.

The latest estimates for our coal resources are given in the accompanying table:

| Class of Coal      | Proved Recoverable<br>(tons) | Probably Recoverable<br>(tons) | Inferred<br>(tons) |
|--------------------|------------------------------|--------------------------------|--------------------|
| Anthracite         | Negligible                   | Negligible                     | —                  |
| Bituminous . . . . | 14,160,000                   | 56,190,000                     | —                  |
| Sub-bituminous     | 139,094,000                  | 103,992,000                    | 321,000,000        |
| Lignite . . . . .  | 147,000,000                  | 377,000,000                    | —                  |

The estimates of the bituminous coal resources are alarmingly lower than were previously calculated and as this is our most valuable coal we must take all steps possible to conserve our supplies. The coal must be used efficiently, i.e., different kinds of coals should be used as far as possible for the purposes for which they are most suited and the technology of utilization should be revised to utilize our sub-bituminous coals and lignites where possible. Last year a Fuel Efficiency Service was initiated by the Dominion Laboratory and already many factories, hospitals, and other large consumers of coal from Auckland to Invercargill have been visited to advise in the more efficient utilization of coal. It is estimated that if the recommendations of the Service were put into effect a saving of about 20% could be achieved without involving any costly alterations to plant. As some 800,000 tons of coal are now used annually in industry, this represents a saving of about 160,000 tons per year.

Attention has already been drawn to the very limited resources of bituminous coal which remain and to the fact that it is upon these that the gas industry depends. The gas industry uses nearly 300,000 tons of coal annually. Most of our remaining bituminous coals contain a relatively high sulphur percentage which causes difficulties in gas purification. The only suitable gas coal available comes from the Liverpool Mine at Greymouth, but as far as can be determined this mine has a life of only a few years. At the present time practically the whole output of this mine is reserved for gas-making. The importance of the gas industry is shown by the fact that its output of energy is equivalent to about 30% of that generated by the electric power stations. As our electric development is not likely to meet the demands for power for a considerable time to come, it is obvious that the gas industry should not be allowed to languish, but should be maintained side by side with hydro-electric development. It is necessary therefore to devise ways of using the more highly sulphurous coals or of using sub-bituminous coals or lignites. Experiments on the application of liquid gas purifying processes for the removal

of the larger amounts of sulphur compounds are now in progress and promise results. The production of gas from sub-bituminous coal and lignite has been extensively investigated by Germany during the war and some of their methods may be applicable here.

Some 900,000 tons of coal per year are used for domestic purposes. This represents nearly one third of our total production. It has been estimated that efficiency of coal burnt for domestic heating is about 15%. The possibilities for economy are so great that a concentrated effort to increase the efficiency of domestic heating must surely be worth while.

### **AUCKLAND BRANCH NOTES**

The Annual Meeting of the Branch was held on October 28th. The following officers were elected for the coming year:

**Chairman:** S. G. Brooker.

**Committee:** G. S. Lambert, D. Whillans, M. B. Rands, J. B. Brown

**Honorary Secretary:** G. Stace.

**Treasurer:** W. E. Russell.

At the conclusion of the formal business sound films were shown about the Petroleum Industry.

Mr. S. G. Brooker, the new chairman of the Auckland Branch and Editor of this Journal, is, like the President, the ex-Editor and the new chairman of the Wellington Branch, an old boy of Christchurch Boys' High School. On leaving this nursery of great men, he joined the Dept. of Agriculture, where he served for 5 years in the chemical laboratory under Mr. B. C. Aston. While there he attended Victoria College, taking his M.Sc. with Honours in 1933. After leaving Wellington he spent some time doing research work on wood, under Prof. Worley, at A.U.C. In 1936 he was appointed Chief Chemist to Messrs Abels Ltd., manufacturers of Margarine, hydrogenated fats, and a variety of other fatty products.

Elected an Associate in 1942, he was almost immediately placed on the Branch Committee. After 2 years in this capacity he was elected to the Secretaryship which he has held for 3 years.

Mr. Brooker has had wide experience on committees and is a local preacher of the Methodist Church. He is married and has 2 children.

**WELLINGTON BRANCH NOTES**

The new Wellington Branch Chairman is Mr. E. S. Borthwick, who was educated at Christchurch Boys' High School, and at Canterbury College, where he graduated M.Sc. in chemistry in 1934. During part of his University course and again after graduating, he held positions on the laboratory staff of the N.Z. Refrigerating Co., Ltd., until in 1936 a transfer was made to Wellington to join the staff of the Shell Oil Company's Hutt Road laboratory. Subsequent to a period as Chemist-in-charge, there he was transferred to the Head Office Technical Department in 1944, in an administrative capacity.

Mr. Borthwick now holds the position of Chief Chemist in the Company. In Institute affairs he is an Associate of both the N.Z. and the Royal Institutes of Chemistry, and has served on two different occasions as a Wellington Branch Committee member; for the past two years he has been Branch Editor and Publicity Officer, and has also acted as Hon. Secretary of the Chemists' Employment Committee.

Mr. G. Maskill Smith addressed the meeting in October in a general talk dealing with his visit to the United States. He was in the U.S. primarily as Scientific Liaison Officer for the Department, but was also acting as technical adviser to the New Zealand Legation on reparations from Japan. During his visit he made many contacts in his own field of chemical engineering and visited some seventy research laboratories. He outlined the work at the Liaison Office, Washington, and the way the various Empire organisations work together. The New Zealand Liaison Office is available to any scientific worker in New Zealand and while the United States is a very large territory to cover, it is anxious to do as much as possible for N.Z. workers.

One particular item he studied was coal, its preparation and utilisation. The use of strip-mining has caused a big reduction in the cost of coal and a much greater production of coal per worker. The coal however, is more contaminated with rock and needs more careful purification. Not a great deal of work is being done on the normal methods of combustion of coal, but there is extensive research being carried out on the pressurised combustion of pulverised coal. Much work is being done on the preparation of liquid fuels from coal and the use of coal as a raw material in the production of various chemicals by means of mild oxidation.

In the food industries one's first impression is the care and cleanliness at all stages. Even in the retail shops there is a pleasing atmosphere of hygiene which strikes the visitor forcibly. Research in canning and quick-freezing is well developed and a visit to one of the large canning and quick-freezing organisations in New Jersey was described. At each stage in the growing and processing, scientific control is in evidence. The crop dusting programme for instance, is under the control of an entomologist who formulates the spraying programme. There is quite a large Cannery Research Association which covers the whole of the U.S. During the season, mobile laboratories visit the various canneries and carry out tests on the current production.

There is quite extensive work being done, particularly by the Government on the utilisation of waste products, and some very interesting research being carried out on low value agricultural products may be of interest here. The manufacture of plastics and use of products of fermentation are two fields worthy of mention.

Discussing N.Z. conditions the speaker thought that first priority should be given to the rationalisation of research in this country. With a population as small as ours there is a limit to the amount of research which can be afforded. There should be a greater amount of research devoted to those industries which had established themselves as economic projects under normal conditions. Technological improvements overseas would have their effect in enabling lower production costs to be obtained and this country should keep up with these. He thought that improvements in process control should take first priority and clear evidence for the need for this was shown by the fuel technology work carried out in this section. Much of this work would apply to many industries and would therefore show a greater return than work of too specialised a nature on one particular industry. Work of this specialised nature would be better left to more industrialised countries such as Gt. Britain and the United States.

### **CANTERBURY BRANCH NOTES**

The Chairman of the Canterbury Branch for 1948, is Mr. L. H. Bird of the Wheat Research Institute. Mr. Bird is a product of Waimate High School and Canterbury College. At the latter institution he first tended to geology, completing the B.Sc. degree in that subject in 1935. Turning to chemistry he graduated M.Sc. in 1938, and has been a member of the staff of the Wheat Research Institute since. From 1941-1945, he

worked in Melbourne for the Munitions Supply Laboratories, being concerned with investigating the problems which arose in the field of explosives and ammunition, and also with development problems. He developed a new principle for the initiation of explosions, upon which work is still in progress in Australia. Apart from the routine problems of the bread industry, Mr. Bird is especially concerned with investigations on oxidising enzymes, in association with Dr. R. Stern.

### OTAGO BRANCH NOTES

Officers for 1948 were elected at the Annual Meeting in October as follows:

**Chairman:** Dr. F. G. Soper.

**Secretary:** Mr. T. H. Kennedy.

**Committee:** Mr. O. H. Keyes, Dr. S. N. Slater, Mr. F. N. Fastier, Mr. C. G. Roberts.

**Hon. Auditor:** Mr. T. A. Thomson.

**Delegate to Council:** Dr. S. N. Slater.

The new Chairman, Professor F. G. Soper, graduated B.Sc. with 1st class Honours in 1920 at the University of North Wales in Bangor, where he then took a position as lecturer in physical chemistry. Subsequently he graduated Ph.D., and in 1928 was awarded D.Sc. in the University of North Wales. Dr. Soper spent short periods in several other Universities, both in Wales and England, and soon became a recognised authority in his chosen branch of chemistry.

In 1936, when senior lecturer at Bangor, he was appointed to the Chair of Chemistry at the University of Otago, and in addition, in the following year he became the Director of the New Zealand Woollen Mills' Research Association. He was president of the local branch in 1937, and has been a committee member and delegate to Council almost every year since then. During the recent war, Dr. Soper was Chemical Advisor on Munitions and Chairman of the Chemical Panel of the Scientific Advisory Committee, as well as carrying on his normal duties. In 1945 and 1946, he was Vice-President of the N.Z.I.C., and last year, President. Dr. Soper was a member of the New Zealand delegation to the Royal Society Empire Scientific Conference in 1946, and he visited many Universities, Wool Research establishments, etc. in Great Britain, Canada and the United States.

He has published more than 30 papers, dealing mostly with molecular conductivity, reaction kinetics in solution, reactions of chloroamines and other allied subjects, and is directing research on the chemical treatment of wool. Besides his connection with the New Zealand Institute, he is a Fellow of the Royal Institute of Chemistry and of the Australian and New Zealand Association for the Advancement of Science.

At the October meeting, Mr. George Gilbert was elected an honorary life-member of the Otago Branch. Mr. Gilbert, better known as "Harry," has been the Senior Laboratory Assistant in the Chemistry Department since 1915, and will be remembered by the many students and others who have known him as a good friend and a wise counsellor. Mr. Gilbert is well-known also as one who can persuade even the most temperamental piece of chemical apparatus to behave as it should, and sometimes even better. He was a foundation member of the Otago Chemical Society, which later merged into the New Zealand Institute of Chemistry, and takes pride in the fact that since the Society started, he has missed only one meeting, a record which speaks for itself. Several members spoke in appreciation of Mr. Gilbert's services to the Otago Branch of the Institute, and related a number of personal anecdotes.

This is believed to be the first occasion on which any of the branches has elected an honorary life-member.

**A NEW SYSTEM OF ORGANIC CHEMICAL NOMENCLATURE**

It was Dr. Samuel Johnson who made the famous remark about women preachers that "it was like a dog dancing on its hind legs—it doesn't do it well, but the marvel is that it can do it at all." Much the same may be said of the Geneva nomenclature instituted in 1892 and still relied on by organic chemists despite the tremendous development of the subject and the discovery of whole classes of new compounds totally unknown fifty years ago. The new system proposed by Dr. Malcolm Dyson should therefore command the attention of everyone interested in the subject. It has been so well received overseas that it bids fair to become accepted as an international standard and before this acceptance it should be examined as fully as possible so that if necessary, any improvements may be made before it crystallises out into a rigidly accepted system.

Dr. Dyson first put forth his ideas in a lecture to the Royal Institute of Chemistry which was published in pamphlet form. Its importance was so evident that it was freely distributed among members of the three British Societies. Dr. Dyson has now published a booklet † further explaining the system. In it each compound has a definite and unique cypher which can be arrived at from a set of rules which can be learned in a few hours' study. A few examples may be of interest: Ethyl Alcohol is C2, Q; Acetone C3, 2EQ; Acetic Acid C2, X; Aniline B.N.; Glycerol C3, 1, 2, 3Q; Cholesterol HJ8, 17C6, 2, 13, 18, 22C, 7Q 1, 12, 14L and Biotin AC5, ZS, 2C5, 10X, 3-4 ANCEQN. A comparison of these with the Geneva names shows that they are far more concise, even if a little bewildering at first. The system is complete even to the extent of providing for cis and trans isomers as well as laevo, dextro racemic and meso. The ciphers are linear without subscripts and do not require any characters not available in the usual font of type. The use of © and of two types of brackets does however, introduce characters not found on a typewriter, which seems to us regrettable.

The various portions of the cipher, and all substituents each have a definite order: e.g., with oxygen containing groups, carboxyl precedes ether, which in turn precedes hydroxy, which is followed by aldehyde (not on a terminal carbon), quinone, other oxo (including ketone) and peroxide in that order. This means that each compound has one and only one place in an index and cross references are thus eliminated, and the system lends itself to the punched card technique. The first five volumes of Beilstein have already been done in this way leading the authors to express the hope that we may shortly have an organic compendium as complete as that tremendous work, but also fully up-to-date and capable of constant revision.

No doubt there are adequate reasons for departing from the conventional O for oxygen, Cl for chlorine and Br for bromine and substituting Q, CL and BR, but they are not given in the booklet. It should be noted that in a letter to the Editor of "Chemical and Engineering News" (16/6/47, p. 1767) Dr. Dyson outlines the application of his system to the carotenoids—an example of a series of compounds very cumbrously named by the Geneva system which preceded their chemical investigation, but adequately handled by the new system. Incidentally Dr. Dyson advises that the use of © has been abandoned except for duplicated aryl nuclei. Another writer to the same journal (Davidson 26/5/47, p. 1544) points out that the ciphers can be easily transposed into Braille, a virtue as welcome as unexpected.

†G. Malcolm Dyson: *A New Notation and Enumeration System for Organic Compounds*. London: Longmans, Green and Co, 1947. 7/6.

The introduction of such a new system may well mark a new era in organic chemistry, and Dr. Dyson is to be congratulated on his efforts. It is hoped that he may shortly issue a textbook with question and answer, so that less astute organic chemists may while away a little of their spare time (sic!) testing their skill at the ciphers.

#### PROFESSOR WARREN L. BADGER

Prof. Warren L. Badger, noted American Chemical Engineer spent a fortnight in New Zealand towards the end of last year at the request of the N.Z. Government to advise on the proposed Solar Salt Works project at Grassmere, Marlborough. Prof. Badger was formerly on the teaching staff of the University of Michigan where he was engaged in development of the concept of the chemical engineer. In developing this line at the University he came increasingly in contact with industrial problems in which he was required to act in a consulting capacity. In 1937 he left the University to act as a private consultant chemical engineer. He is still nominally on the staff of the University and is still directing research. Prof. Badger is an expert in the processes of concentration, evaporation and filtration and has therefore been engaged for the most part in the salt and caustic industries. He has supervised the erection of plant in England, Sweden, Holland and Switzerland as well as the Americas and has continuous connections with some firms in these countries.

When interviewed at Auckland on behalf of the Journal of the N.Z.I.C., Prof. Badger was not slow in expanding on his favourite theme of the place of the Chemical Engineer in industry. In emphasising the difference between the duties of the chemical engineer and works chemist he pointed out that the habitat of the chemical engineer is in the plant while that of the chemist is the laboratory. The temperaments of the two must be entirely different, the chemist being contented with the quieter waters of the laboratory while the chemical engineer applies his results to plant operation. It is not a question of one trying to do the job of the other. Prof. Badger said that industry in Europe depends largely on the separate chemist and engineer but is beginning to realise the need for chemical engineers. He made a visit to Germany in 1937 to organise courses in chemical engineering, but the project fell through. Recently he was asked to undertake such a course in Switzerland.

In speaking of some of his projects Prof. Badger discussed some of the applications of "Dowtherm." This is a mixture of diphenyl and diphenyl ether used as a heat transfer medium for high temperatures. It lacks the disadvantage of the high pressures necessary when steam is used and is capable of very exact temperature control. In Nylon Spinning for instance the spinnerets are heated with "Dowtherm" which maintains the temperature at  $550 \pm 1^\circ\text{F}$ .

Prof. Badger is probably best known as co-author with Dr. McCabe of the "Elements of Chemical Engineering." A new edition, so radically altered as to amount to a complete rewriting, is being prepared, but Prof. Badger was unable to say when it would be available.

### COUNCIL MEETING, 27/8/47.

*Amendments to Rules:* Rule 21.4 was altered to allow for the appointment of separate members to the offices of Secretary and Treasurer of a Branch, though they may still be combined if desired. The number of members of a Branch Committee may therefore be either seven or six.

*Employment Committee:* Reported 28 on roll, and 192 positions circularised so far this year. Mr. E. S. Borthwick to be Secretary.

*Conference:* Our share of the cost of the 1947 Conference £36/2/11. Whole organisation of 1948 Conference to be in the hands of the Otago Branch.

*Industrial Chemical Essay Prize:* The next Essay competition to be held in 1950 with a prize of £25. A reserve of £15 to be set aside each year for the purpose.

### ANNUAL MEETING—COUNCIL-IN-PERSON, 27/11/47.

*Present:* Professor Soper, President; Dr. J. K. Dixon, Vice-President; R. H. J. Stansfield, Auckland delegate; J. L. Mandeno, Wellington delegate; F. H. G. Johnstone, Canterbury delegate; Dr. S. N. Slater, Otago delegate; W. G. Hughson, Hon. Secretary-Treasurer, K. H. Palmer, Registrar.

Also present by invitation: B. E. Jackson, Auckland Proxy; L. H. James, Otago Proxy; Dr. H. N. Parton, Retiring Editor; S. G. Brooker, Editor Elect.

*Journal:* Matter to be supplied to the "New Zealand Science Review" at the discretion of the Editor and a number of free copies to be secured in exchange.

*Salary Survey:* Decided that a survey similar to that of 1944 be undertaken and Dr. Dixon and Mr. Mandeno appointed a committee for the purpose.

*Chemists in the Waikato and Palmerston North:* Reported no desire to form separate branches in these places.

*Appointment of Registrar:* The Registrar reported that the amount of work required would cost £150 at the scale rate of fees. Resolved that the Registrar be appointed at a salary of £100 per annum and that his work be reduced to an amount commensurate with such fee.

*Collection of Subscriptions:* A suggestion by Otago that the Registrar collect subscriptions was not approved.

*Election of Officers:* President, Dr. Dixon (Wellington); Vice-President, Professor J. Packer (Canterbury); Hon. General Secretary-Treasurer, W. G. Hughson (Wellington); Hon. Editor, S. G. Brooker (Auckland); Branch Delegates, S. G. Brooker (Auckland), J. L. Mandeno (Wellington), F. H. G. Johnstone (Canterbury), Dr. S. N. Slater (Otago)

### NEW FELLOWS.

Professor Emeritus F. P. Worley of Auckland, has been unanimously elected an Honorary Fellow of the Institute, a distinction limited to five members by the rules. Some account of Professor Worley's work was given in the March, 1947 issue.

Prof. J. F. Llewellyn of Auckland, has been elected a Fellow under Rule 9 iii. An outline of his career was given in our last issue.

Mr. N. T. Clare, M.Sc. (1935), Senior Biochemist at the Animal Research Station since 1945, and an Associate since 1936. Has made a study of porphyrin metabolism of animals and has recently done some work on phenothiazine. At present overseas (See personal Notes).

### NEW ASSOCIATES

Francis Desmond Dorofoeff, B.Sc., 1945, Asst. Chemist, Soil Fertility Research Station, Hamilton.

Roberta May Anderson, B.H.Sc., 1929, B.Sc., 1945, Teacher, Christchurch Girls' High School.

Robert Malcolm Sinclair, M.Sc., 1941. After experience as paint chemist at Munitions Supply Laboratory, Marbyrnong, Australia, is now Chief Chemist at International Paints (N.Z.) Ltd., Wellington.

Duncan Ernest Moffat, B.Sc., 1945, Asst. Chemist, N.Z. Woollen Mills Research Association, Dunedin.

### PERSONAL NOTES

Mr. W. Philip White, for many years Director of the Leather and Shoe Research Association, Wellington, is believed to have a post with the Board of Trade, London, dealing with the control and supply of materials to tanners.

Mr. R. T. Danvers, formerly Auckland Branch Secretary, and subsequently with Wattie's Canneries, Hastings, is now Assistant to the Factory Manager at Messrs Poulton and Noel, Ltd., Bridge Road, Southall, Middlesex. The factory is engaged in canning a variety of products as well as packing fish and meat pastes.

Mr. R. M. Winter, M.Sc., who graduated from Auckland University College in 1920, has been appointed Director of Research for Imperial Chemical Industries Ltd., succeeding Dr. Roland Slade. Mr. Winter has been in England ever since he went there on an 1851 Exhibition Scholarship in 1921.

Dr. R. A. Robinson, who resigned the post of Associate Professor at Auckland last year, has accepted the chair of Chemistry at Raffles College, Singapore, which will probably be incorporated into the new University of Malaya. With Mr. R. H. Stokes, winner of the Meldola medal and one of the Professor's most brilliant pupils at Auckland, he has been invited to contribute a paper to a symposium to be conducted by the New York Academy of Sciences next April to celebrate the 25th Anniversary of the Debye-Huckel theory of the inter-ionic attraction of electrolytes. Other contributors are H. S. Harned, L. Onsager, D. A. MacInnes, G. Scatchard and N. Bjerrum.

Mr. A. J. Metson, Officer in Charge of Soil Survey Chemistry, D.S.I.R., left early this month by the "Marine Phoenix" for America under a rehabilitation bursary. He expects to be absent for a year and to work with Professor C. E. Marshall at the University of Missouri on new techniques for the estimation of clay minerals in soils.

Dr. H. C. Holland, Manager of Sutherlands' Tanneries, Auckland, has been elected a Fellow of the Royal Institute of Chemistry.

Mr. N. T. Clare, who was elected a Fellow at the last meeting of Council, has been appointed Chief Biochemist at the Ruakura Animal Research Station. He is at present visiting South Africa and England in connection with his new duties.

A team of New Zealand Scientists have been largely responsible for the design of the first atomic pile at the Atomic Energy Research Establishment at Harwell, England. This was the Graphite Low Energy Experimental Pile—Gleep—and one of the team was Mr. I. K. Walker, M.Sc., who before his call-up for special duties during the war was on the staff of the Dominion Laboratory, Wellington.

Mr. W. A. Joiner, M.Sc., F.R.I.C., Dip. Chem. Eng., A.M.I. Chem. E., has relinquished the position of Director of the Dominion Laboratory, and Dominion Analyst to take up a Senior Administrative position at the Head Office, D.S.I.R., Wellington, where he will be supervising the chemical and geological activities of the Department.

Mr. F. J. T. Grigg, M.Sc., F.R.I.C., has been appointed to succeed Mr. Joiner as Director of the Dominion Laboratory and Dominion Analyst. Mr. Grigg, who was previously Asst. Director and Deputy Dominion Analyst, was educated at Thames High School and School of Mines, and Victoria College, where he took M.Sc. with honours in Chemistry in 1922. He was Government Analyst at Christchurch from 1925 to 1946. He visited England in 1936 to study matters connected with food and drugs, toxicology, river pollution, water, sewage and research. He has published several papers on water, milk and toxicology, and has been Crown Witness in a large number of criminal and other cases. At different times, Mr. Grigg has served on the Councils of the N.Z. Institute of Chemistry, the New Zealand Branch of the Royal Institute of Chemistry, and the Royal Society of New Zealand. At the time of his transfer from Christchurch he was President-Elect of the Canterbury section of the Royal Society.

## NEW COMPOUNDS AND REACTIONS.

We congratulate Dr. and Mrs. F. B. Shorland of Wellington, on the discovery of two new isomeric compounds, one *trans* and one *cis*.

We extend our good wishes to Dr. and Mrs. H. E. Annett of Matangi, who were co-precipitated at St. Columba's Church, Frankton, on January 3rd.

### Laboratory Assistant's Certificate Examination Results, November, 1947.

The following candidates have been credited with passes in the subjects indicated, in the Institute's Examination.

#### SUBJECTS:

Chemistry (1), Physics (2), Calculations (3), Practical Chemistry (4), Glass-blowing (5), Metalwork (6), Photography (7), Care and Management of Laboratory Animals (8).

N. C. Ashman, 1, 2, 3; Joan P. Cook, 3; Pamela M. Cooper, 1; Judith E. Fisher, 1, 2; J. G. Fraser, 5, 6; I. Hull-Brown, 2, 3; B. J. Stephenson, 8; A. P. Underhill, 1; N. S. Strawbridge, 4, 7.

## THE SEVENTH PACIFIC SCIENCE CONGRESS

The President has been asked to join the organising committee of the above Congress which will be held in February, 1949. The Congress will deal with different aspects of the natural resources of the Pacific area and will meet in Auckland for a week, followed by a week's tour of the North Island to places of scientific interest. The Congress will then move to Christchurch for a week, after which post-Congress tours will be arranged in both Islands. The Government has made a grant of £10,000 towards the expenses of the Congress and the entertainment of overseas visitors. The President of the Congress will be Dr. R. A. Falla of Wellington, President of the Royal Society of New Zealand, and the Secretary-General is Dr. G. Archey, Auckland War Memorial Museum.

## FOOD PARCELS FOR BRITAIN

The following is an extract from a letter received by Dr. Dixon as representative of the Royal Institute of Chemistry in New Zealand, from the headquarters of the Institute in London:

"Dear Dr. Dixon,

During the past few weeks, I have been receiving most touching letters of gratitude from regular beneficiaries under our benevolent fund who have received food parcels from New Zealand and I understand many of them have been writing to you and to the individual donors in similar terms.

At the last meeting of the Benevolent Fund Committee, I was asked to write on behalf of the Chairman and members of the Committee to express their appreciation of the very generous action taken by you and your colleagues in New Zealand. There is no doubt that these food parcels have made a great difference to the old people and widows who are being helped by our fund and we should like you to accept for yourself and convey to your colleagues the sincere thanks of all who are concerned with the administration of the fund.

With best wishes for 1948.

Yours sincerely,

(Signed) H. J. T. Ellingham.

Secretary."

## OFFICIAL ANNOUNCEMENTS

The New Zealand Institute of Chemistry assumes no responsibility for statements appearing in this Journal.

The Editor invites submission of manuscripts suitable for publication in the Journal. The most useful material includes reviews with particular reference to New Zealand Chemistry and Industry, or modifications of apparatus, hints on analytical and research methods, and reviews of books.

Members are asked to support our advertisers, whose support makes the Journal possible. Advertising rates are available from the Business Manager.

## SALARY SURVEY

Members of the Institute will already have received a form seeking information on salaries. If you have not yet completed it, kindly do so as soon as possible. It is essential to have a good response to make the summary have any value at all for some sections of the profession. As it is hoped to publish the results of the survey in our next issue (which goes to press early in May), the need for your prompt co-operation is emphasised.

## THE ADDRESS OF MR. GORDON STACE

The Address of Mr. Gordon Stace, Secretary of the Auckland Branch, is c/o. Dominion Laboratory, Durham St., Auckland, and not as stated in the cyclostyled list sent out to members.

## A.N.Z.A.A.S.

The next meeting of the Australian and New Zealand Association for the Advancement of Science will be held at Hobart, Tasmania from 12th to 19th (inclusive) January, 1949.

## COMPETITION

### BOOK PLATE DESIGN

The Council of the Institute offers a prize of £5 for an acceptable design for an Institute Book-plate such as would be suitable for affixing to Institute prizes, etc.

For conditions governing the competition apply to Hon. General Secretary, P.O. Box 250, Wellington, C.I. Competition closes on 31st May, 1948.

## ERRATA

December, 1947 issue—Committee for Plant Analytical Methods.

P. 104 4 lines from bottom + 1.5% should be  $\pm 1.5\%$ .

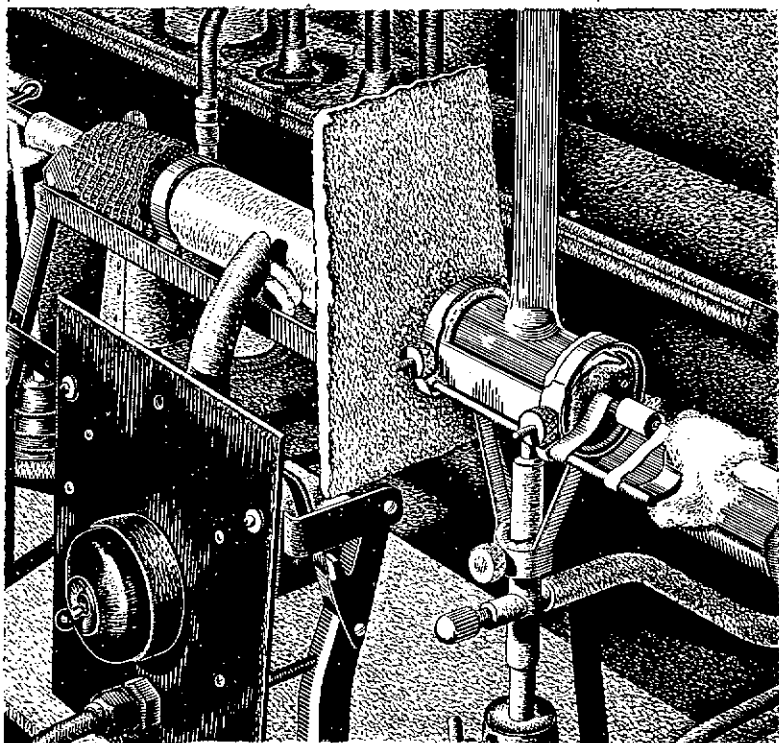
P. 106, 9 lines from top "ammonium" should be "calcium."

P. 106, 21 lines from top 1/20 should be N/20.

P. 106, last line. A bracket should go before "If there . . ." to correspond with the bracket in the 3rd line of P. 107.

**WANTED**—Journal of the Society of Chemical Industry, Vol. 65, Nos. 4 and 5, April and May, 1946. Dep. of Scientific and Industrial Research, P.O. Box 18, Govt. Buildings, Wellington.

# Trial by Fire



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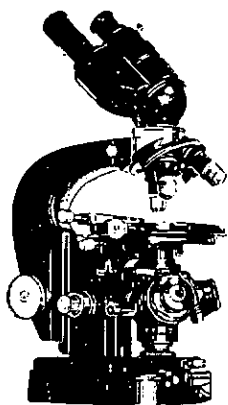
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