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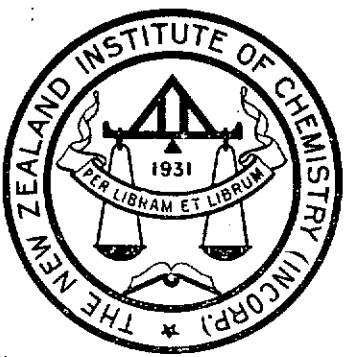

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VOLUME IX. JUNE, 1945 NO. 2

EDITORIAL

A sentence in the letter we publish in this issue from Mr. E. Leese calls for comment; "graduates in science" he states "are far from being adequately equipped when seeking openings in industry." The very breadth of such generalisations are their own refutation, at least in the sciences. This one means, we take it, that graduates who have been successful in industry, and they are not few, have equipped themselves after graduation, in the many ways in which their degree courses were lacking. We believe this is as it should be, there are many things which an educated man can do for himself. One of the discoveries made in war-time Britain was the versatility of her scientists. We know ourselves an economist turned meteorologist, a zoologist turned factory manager, and chemistry graduates who have ranged from radar to bomb disposal. Perhaps industrial management has a little to learn too, about using the versatility of a trained intelligence.

With regard to engineering, it exists already as a university faculty, and its combination with chemistry has now been achieved in New Zealand. We are ourselves of those who think that the technological faculties would be best served in a separate institution, leaving the universities to their proper functions of research and teaching, "conceived as hovering on the borders of the unknown, conducted even in the realm of the already ascertained, in the spirit of doubt and inquiry." (Flexner).

Mr. Longbottom's plea for improved technical colleges seems to us soundly based. It should be realised that the "sound knowledge of chemistry and physics" which Mr. Leese expects to be a part of the chemical engineering training, will inevitably be given in the classes which produce the industrially inadequate graduate of his experience. Moreover a sound knowledge of modern chemistry is no longer to be obtained in three years.

Whatever differences of opinion exist on these matters, the action of the University Senate in establishing a degree in chemical engineering is a recognition of the importance of applied chemistry, and of the professional standing of chemists. A responsibility is placed on industries using chemical knowledge, to see that graduates in the new course find employment here, and do not merely become part of our brain-exporting industry.

MAY COUNCIL MEETING.

Dr. J. C. Andrews, President, presided over the quarterly Council Meeting held in Wellington on May 2nd and 3rd, 1945. The Vice-President, Professor F. G. Soper, the Wellington delegate and proxies for Auckland, Canterbury and Otago were also present.

SALARIES.—Dr. J. K. Dixon reported that, as the representative of Chemists in the Public Service, he had conferred with the sub-committee of the Institute which was set up at last meeting to prepare a statement on salaries for consideration by the Consultative Committee. A meeting of representatives from all scientific groups within the D.S.I.R. and other Government Departments, decided to present to the Consultative Committee a combined scientists' case. Dr. Dixon said that a general case for all professional groups had been prepared and a copy was in the hands of the Secretary. The Scientists' case which was almost completed was to be ratified by the scientific groups committee on May 4th, and would be presented to the Consultative Committee on May 5th.

EMPLOYMENT REGISTER.—The Secretary of the Chemists' Employment Committee said a meeting was to be held on May 4th to consider details of the forms which would be sent to chemists seeking employment or change of employment, and to firms requiring chemists.

MEDICAL ADVERTISEMENTS.—Mr. L. H. James has agreed to act on the sub-committee in place of Mr. O. H. Keys, who is now Government Analyst, Dunedin. The sub-committee reported having interviewed the Secretary of the Medical Advertisements Board regarding Vitamins in beer, Vita-Stout, and a statement on the packet of Baxter's Lung Preserver.

JOURNAL.—It was decided not to produce a special Conference number this year. Branches agreed to a further increase in advertising space provided the text was kept together and provided the advertisements were suitable for our particular type of Journal.

BOOK PLATE.—The Branches are in favour of the preparation of a book plate for the Industrial Chemical Essay Prize Books. It was decided to ask Mr. W. A. Joiner to prepare a design.

RECOGNITION OF A.N.Z.I.C., and of LABORATORY ASSISTANTS' CERTIFICATE.—The Public Service Commission received a deputation from the Institute and has now agreed to recognize the Associateship of the Institute as ad-

mitting the holder to the Professional Division. The qualification will also be noted on the Classification List.

The Institute's Certificate for Laboratory Assistants is also recognized and the recognition will be accompanied by a double rise but not beyond £335 old (1944) scale.

PUBLIC SERVICE REHABILITATION COMMITTEE.—Dr. J. K. Dixon has been appointed to represent the Institute on a small committee which is to consider recommendations regarding returned servicemen proceeding to University degrees while engaged in the Public Service.

ELECTION OF FELLOW.—Dr. R. A. Robinson, Senior Lecturer in Physical Chemistry, Auckland University College, has been elected a Fellow of the New Zealand Institute of Chemistry. Dr. Robinson has a Doctorate in Science, a Ph.D. (Birmingham) and is a Fellow of the Royal Institute of Chemistry of Great Britain and Ireland. His publications appear in British, American and New Zealand Journals, and he was Sterling Research Fellow at Yale University, U.S.A., in 1940.

ELECTION OF ASSOCIATES.—Council has much pleasure in announcing that at the May meeting the following were elected Associates of the New Zealand Institute of Chemistry:—

Mr. R. M. Allison took his M.Sc. degree at Canterbury University College. After four years at the Wheat Research Institute, Christchurch, he took up his present position in the Auckland branch of the Dominion Laboratory.

Mr. B. W. Collins, M.Sc. was also a student at Canterbury College. After taking his B.Sc. degree he held positions as surveyor, geologist and paleontologist in petroleum prospecting work in New Zealand and in New Guinea. Since 1942 he has been engaged as Chemist with the Dominion Compressed Yeast Co. in Christchurch and Auckland.

Mr. J. E. Hayward, B. Sc. Auckland University College, 1941, is now Chief Chemist to the Colonial Ammunition Co., Hamilton. He was in Suva for a short time in the Government Laboratory there.

Mr. P. B. D. de la Mare, graduated M. Sc. in 1942 from Victoria University College. Since then he has been engaged as chemist in the Agricultural Department first in Wellington and now at Ruakura.

Mr. N. O. Bathurst, M.Sc., since taking his degree in 1936 has been a chemist in the Plant Chemistry Laboratory, Palmerston North.

Mr. R. M. Greenwood took his M.Sc. degree at Canterbury University College in 1942. He is now at the Plant Chemistry Laboratory, Palmerston North.

Mr. B. L. Elphick, Assistant Lecturer in Chemistry, Canterbury Agricultural College, Lincoln, holds a London University Honours B.Sc. For 2½ years he was with the Research Laboratories of the Anglo-Persian Oil Co., London, and since coming to New Zealand has been mainly engaged in teaching science and agriculture in schools, at Massey Agricultural College and now at Lincoln.

Mr. D. S. Cumberbeach took his M.Sc. degree at Otago University in 1939. After about 2 years in the Dept. of Bacteriology Medical School, Dunedin, a year in the Army and over a year at Maribyrnong, Melbourne, he is now engaged as chemist to Donaghy's Rope and Twine Co. Ltd., Auckland.

Mr. D. H. McLean, Chemist to Ross and Glendinning Ltd., Roslyn Mills, Dunedin, took his M.Sc. degree at Otago University in 1939. Prior to taking up his present position he was successively Duffus-Lubecki Scholar in Applied Science and John Edmond Fellow in Industrial Research.

The Assistant Secretary, Mr. L. Wilkinson, has been appointed Business Manager of the Journal.

ANNUAL CONFERENCE.

At the May Council Meeting, the Secretary stated that twenty-two offers to give papers had been received from Nelson, Wallaceville and Wellington. The Secretary has been instructed to communicate with representatives in other centres and when replies are received the programme will be prepared and selected contributors asked to forward the full text of their paper before the end of July so that papers can be cyclostyled and distributed to members before the Conference. This should stimulate greatly that main part of the paper—the discussion, and should enable Conference to deal with more papers.

Early in June the programme and a form of invitation will be forwarded to all members. These forms should be returned before the end of June as it is necessary to give the Palmerston hotels good warning as to the number attending Conference.

Conference dates, August 28th, mid-day, to August 30th, mid-day.

BRANCH NOTES

AUCKLAND BRANCH

Mr. R. W. Norcross, who is on loan from the Birdseye Food Corporation to the N.Z. Government, gave an address on "Quick Freezing," at the April Meeting.

Mr. Norcross opened his address by quoting as a definition of refrigeration, "It is a process of removing heat from a confined space for the purpose of reducing and maintaining the temperature of the enclosed space below that of the surrounding atmosphere." The idea of quick freezing was conceived by Clarence Birdseye when catching fish in the Arctic. The fish would be practically frozen before he got them off the hook, but on thawing them out in his igloo, he found that they often commenced to swim again. His first patent covered a froster comprising two superimposed belts of a stainless material both travelling in the same direction through a tunnel upon which a brine of —45 to —50 F. was sprayed top and bottom with the package in between. The modern Birdseye multiplate freezer, consists of a series of superimposed refrigerated hollow metal plates actuated by hydraulic pressure in such a manner that they may be opened to receive the product and then closed on the product to any desired pressure. The plates are connected by flexible hose at opposing corners to a surge drum located on top of the froster where a constant level of ammonia is maintained through float control and also where the evaporated gas can be separated and returned to the compressors. Compared with the original set-up this reduced floor space from 500 to 38 square feet, and reduced costs to a level where anyone could afford to use quick-freeze foods.

The products so treated in normal times amount to about 60 different items of fruits, vegetables, sea-foods, meats and poultry. To peaches and apricots, Vitamin C or d-Isoascorbic acid is added to retard oxidation on thawing out. Though not processed in U.S.A., eels were being experimented on in New Zealand. With poultry, the birds are now packed in latex bags by the Cry-O-Vac process. The Birdseye corporation had now gone into poultry producing on its own, and had special diets and methods of raising which resulted in a larger proportion of white meat on the birds. The standard was set that "In order to bring a top quality product from storage it had to be tops going in." All the goods processed must measure up to certain standards before being accepted for quick freezing. Peas were tested with a "tenderometer." Quality control checks were made all the way through the process and

a continuous record kept. The final product was put through a bacteriological count, a cooking test, weight and fragment test etc. Quick freezing of pork eliminated the danger of trichinosis.

Mr. Norcross went on to discuss the type of package required. It should have the following points:— Strength, reasonable manufacturing cost, suitability for use with automatic machinery, and sales appeal; it must be odourless, tasteless and non-toxic and finally moisture and vapour proof. A large variety of packages were used depending on the product packed, but research was going on to get a package adaptable to all products. Each wrapped article forms its own ice-seal, in the case of sea-foods and poultry and vegetables which are wrapped in cellophane. For storage, temperatures of —10 to 0° F are required, and at this temperature, it has been shown that very little loss of Vitamin C occurs. The refrigerated railway cars have bunkers holding 4½ to 7 tons of ice to maintain the cargo at—10 to 0° F. The biggest recent improvement is the South African roof tank car, where the roof is a bunker and the ends and side walls are merely brine tanks for insulation. Racks are not required and load can go right up to the roof, so that 20—25% more payload can be obtained. Silica-Gel operating on the absorption principle of refrigeration, mechanical refrigeration, and the use of dry ice have been tried out on refrigerator cars, but are not being used at present, but the last has proved satisfactory for refrigerated road haulage. The speaker also dealt with the question of marketing and disclosed that his company has 15,000 retail outlets in 1942.

The advantages of frozen foods as against fresh were as follows:—

1. Farm freshness and consistent quality regardless of season. Food value retained. 2. Known quantity. Every ounce edible since bones, pea pods, etc., are all removed in the processing. 3. Labour saving. 4. Cooking time reduced, particularly for vegetables. 5. Wide variety all the year round. 6. Economical. 7. Money back guarantee. Many of these advantages are shared with canned goods with which quick-frozen goods do not compete.

The advantages of quick freezing over slow freezing are as follows:—

1. The ice crystals formed are much smaller and therefore cause much less damage to the cells. 2. The freezing period being much shorter, less time is allowed for the diffusion of salts and the separation of water in the form of ice. 3. The product is quickly cooled below the temperature at which bacterial, mould and yeast growth occur, thus preventing decomposition during freezing. (Tressler, 1932).

It has been found that certain losses of Vitamin C occurred during processing, but there was less loss during cooking, so that when served frozen vegetables had as much Vitamin C as fresh ones. Some workers consider frozen peas superior in this regard.

Mr. Norcross stated that at present all quick-frozen meat was being used by the armed forces, and he considered that frozen food had contributed to the well-being of the troops more than any other food line. A lively and prolonged discussion closed with a hearty vote of thanks to the speaker, followed by supper.

PERSONAL.

Mr. Eric Pain, who has served on the branch committee since November 1943, has left N.Z. Plywoods to take up an appointment with Messrs. H. W. Lawrence and Sons, Johnsonville, Wellington.

Mr. Maurice Sutherland of the Dominion Laboratory has been co-opted to fill the vacancy on the committee.

Mr. W. L. (Bill) Barr has transferred from Industrial Chemicals to Maison Carlyle (N.Z.) Ltd.

New local members are Messrs. R. R. Boaden, Assistant Chemist, Westfield Freezing Works; G. F. Peters, lately of Wilsons Portland Cement Co., now of Amalgamated Brick and Pipe Co.'s pottery factory at New Lynn; T. J. Sprott, P. J. Gallaher and W. E. Harvey, Honours students at A.U.C.

WELLINGTON BRANCH

Mr. D. H. Freeman, the Branch Chairman for 1945 was educated at Sydney High School and Sydney University, graduating B.Sc. (1st Class Honours) in 1938. After graduating he became attached to the Laboratory staff of the Eveready (Aust.) Pty. Ltd. engaged firstly in research and later on analytical and works control in the Sydney and later in the Melbourne factory, both of which are mass producing dry cell batteries.

He transferred to the New Zealand subsidiary factory "National Carbon Pty. Limited" in Wellington, towards the end of 1940 in the capacity of Works Chemist and since 1942 as Production Manager. Mr. Freeman graduated M.Sc. at Victoria College, 1941, and is also an Associate Member of the Australian Chemical Institute.

The Chairman's Address was delivered on Tuesday, 24th April, in the Biology Dept. V.U.C.

Mr. Freeman took as his subject "Quality Control" as affecting both primary and secondary industries in New Zealand. Reference was made to the general tendency for the quality of manufactured products to fall during a period of short supply and lack of competition and we should be fully prepared in a relatively short time to face up to strong overseas competition. There can be no doubt that firstly the survival and secondly the growth of New Zealand industry will, to a large extent, depend on the quality of our products.

An outline of the function of the chemist in industry was given and the relation of chemical research, raw material analysis and laboratory works control methods on the quality of the manufactured product was emphasised. Applied research is always necessary and apart from seeking alternative products, research into methods of improving quality in some way or other and of reducing cost by modifying the production method without sacrificing quality must be continually going forward if an industry is to prosper. Particularly is research of importance at the present time due to the necessity of using alternative or substitute raw materials.

The first elementary requirement for quality in any manufactured product was the need for sound initial quality of the raw material from which the goods are to be manufactured. Quality control demands that all the raw materials whether chemical or not should be analysed and checked to determine whether or not they conform to the specifications required for the subsequent manufacturing processes. This applies also to bulk chemicals even coming from highly reputable companies, particularly if they come from overseas, because of deterioration in product as the result of shipping and storage delays, indistinct identification markings on bags and cases, or wharf loading errors.

It was explained that critical analysis should not stop at chemical analysis—all materials to be utilised in the manufacture and which could in any way influence the quality of the commodity must be quality checked against standards and thus it is normal procedure in quality control for all goods received into store, whether chemical or not to be quality checked and certified as passing specifications, by the laboratory before being consumed in production.

The necessity of keeping accurate records of all data relating to each shipment together with analysis was stressed in order that fluctuation in quality at some subsequent date may be reconciled with the records.

Perhaps the most important function of the chemist in maintaining uniformly high quality is that of carrying out routine process control testing in conjunction with production

departments. The problems of routine procedure naturally are specific for individual industries but certain principles apply generally.

For example, a technical manual of manufacturing technique on all process operations should be held by the control chemist and be kept always up to date and amended in accordance with each process alteration. Particularly is it important to keep records of the date of process changes in order that they can be traced down to quality variation.

Again for quality control it is obvious that definite specifications should be established within which the quality of the article must fall not only at the final inspection stage but also at each and every process. The specifications should be standardized, grouped in relation to the various processes and kept up to date just as in the case of manufacturing technique procedure. Mention was made of the relation of cost to quality specifications and that much care in regard to setting up a production specification must be taken, for once established it means that if the maximum limit is exceeded excessive production cost would probably result and if the minimum limit is exceeded a significant and noticeable influence on quality would result.

A further feature of quality control is the detection and elimination as far as possible of wastage arising through failure to conform with quality specifications and it was shown that the percentage of rejection in final inspection largely depends on the efficiency of control measures taken in the various stages of the process. Again the need for keeping accurate records showing how the quality of the product was conforming to specifications at each stage of manufacture was emphasised.

The speaker then introduced the more recent statistical method of quality control as developed largely since 1940. With the rigid control of quality of munitions and the need to avoid wholesale use of materials and manpower it became essential for quality control measures in all processes of manufacture of such munitions to be intensified, and reference was made to important standards issued by the Standards Institute of Great Britain and America in 1940, 1941 and 1942 in which were discussed ample and direct methods to be used in the control of quality.

The main features in the more recent development of quality control is the use and interpretation of quality records.

It was shown that the first characteristic of controlled quality was that it was a variable quality and the problem is how much may the quality of a manufactured product vary and yet be controlled or in other words how much variation should be left to chance.

The second characteristic is that controlled quality shows constant variability within definite limits. The application of statistical methods to science generally was outlined and particularly reference was then made to the application to quality control methods which have been recently developed to such an extent that unknown causes of variation in the quality of a product as making it vary from natural limits and which are called assignable causes can be found and eliminated.

The application of quality control methods to various types of industry was instanced together with the purpose and manner of collecting control data. The graphical presentation of data on control charts, the need for a definite control criterion and the establishment of control limits were discussed indicating both the statistical and pratical sides.

The advantages of the control were enumerated and various measures used for stating quality such as average, standard deviation, etc., were mentioned.

Throughout the address many practical instances were quoted illustrating the main points and reference was made to the application of statistical method of control actively being carried out in certain N.Z. factories and in certain organised research work.

In concluding his address, Mr. Freeman emphasised the growing importance of statistical application in making the most use of accumulated scientific data and stated that the chemist's great value to industry is not so much the actual chemical work he does but the accurate interpretation of his results which depends in turn upon his complete awareness of the meaning of significant and non-significant variations in his experimental and control data.

CANTERBURY BRANCH.

The Chairman for 1945, Mr. H. V. Rowe, was educated at Christ's College and Canterbury College. He was Senior University Scholar in Chemistry in 1913, and graduated M.A. with First Class Honours in Chemistry in 1915. After holding a National Research Scholarship for a short time, he joined the staff of Christchurch Boy's High School where he has remained except for a period on active service in the first world war. He became head of the science and mathematics department in 1925, and first assistant in 1935. Under Mr. Rowe the record of pupils of the school in these subjects has been a notable one, including a number of travelling scholarships in chemistry.

Mr. Rowe's address was entitled, "The New Prospect in Secondary Education." He outlined first the history of secondary school education in the last decade, from the introduction

of the School Certificate Examination, and explained the new proposals for University Entrance, including the accrediting system. An outline of the report of the Consultative Committee set up in 1942 to consider the implications of accrediting for University Entrance followed, and Mr. Rowe went on to consider the problems facing the schools today.

"The first problem is, of course, the arrangement of courses and the selection of subjects to meet the real needs of the pupils. In the past, secondary education has been greatly influenced by demands for attainments which would assist in the securing of employment. Until there is a change in the attitude of the public and a greater appreciation of the importance of a well-educated community, this demand cannot be disregarded, and provision will have to be made in some courses for vocational subjects. As regards the question of vocational training it is of interest to note some remarks by the educationist, Sir Percy Nunn:—"Work which carries a boy directly toward the goal of his choice, work whose obvious usefulness gives him a sense of dignity and power, often unlocks the finer energies of a mind which a general education would leave stupid and inert. The boy's whole entellectual vitality may be heightened, his sense of spiritual values quickened. In short, the vocational training may become in the strictest sense liberal."

It seems to me that whether subjects are cultural or vocational matters less than that the courses taken should be reasonably balanced and should arouse the interest of the pupil, encourage him to work with diligence, and develop clear thinking and accurate expression. The fact that in the past many pupils have had to study subjects in which they had no interest and which had little meaning for them has been a major weakness of secondary education.

Assuming then that the courses and subjects have been decided on, the next problem for the school will be the organisation of these. It must be decided what time is to be allotted to each subject, what classes various members of the staff are to take. Different teachers have different specialised qualifications and interests and these should be used in the best way.

The Institute as a whole is not responsible for statements and opinions appearing in this Journal.

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

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

The time-table must then be made to give effect to the changes. Other problems are those of adequate staffing and equipment.

The suggested prescriptions in science for the secondary school 'core' and for the School Certificate have evidently been drawn up to give effect to two aims in particular:—

(1) Every pupil should receive at least a minimum of instruction in General Science.

(2) Attention should be paid to the practical applications of science to daily life and to industry.

As regards General Science the committee agrees with the recommendation of the Spens report that a science course should be general for the first two or three years. General Science has accordingly been included in the proposed compulsory 'core'. For those whose courses or interests make a more intensive study of science desirable the following subjects are included in the options for School Certificate: General Science (to a considerably higher standard than is required in the 'core'), Biology, Chemistry, Electricity and Magnetism, Heat, Light and Sound. There are also some technological subjects suitable for technical school courses.

The subject of General Science is one which may require a little explanation. The English Science Masters' Association in 1936 gave the following definition:—"General Science is a course of study and investigation which has its roots in the common experience of children and does not exclude any of the fundamental special sciences."

In the past, the requirements of the University Entrance Examination have resulted in pupils being taught one branch of science to the exclusion of others. In the case of boys the science has generally been chemistry, although in some cases electricity and magnetism has been studied instead. This has resulted in a rather one-sided knowledge as far as science is concerned. It has been possible to adjust the balance in the case of pupils who go on to sixth forms by providing, in some schools at any rate, more extensive courses in science. But not all students entering the University have as wide a foundation in science as is desirable. Moreover it must be remembered that the great majority of pupils do not go past the fifth forms and for these the courses up to this point must be made reasonably complete. A course of Scientific Study which excludes for example elementary biology and physiology or physics is not what it should be. There is a strong case for making school courses in science more general. Care is necessary, however, to prevent such a course resulting in nothing more than a smattering of information.

It is interesting to note that in the Report of the Chemistry

Education Advisory Board on the Education and Training of Chemists published by the Royal Institute of Chemistry last year there is an almost identical expression of opinion regarding the teaching of science to junior pupils. "We recognise that success in arousing the interest of a pupil in the phenomena of nature and of creating the right attitude to scientific enquiry, depends very largely on the teacher. It is of importance, therefore, that a considerable degree of freedom should be given to the teacher to adapt his instruction according to the circumstances of his pupils, his own interests, and his surroundings."

The General Science option for School Certificate requires in addition to the 'core' science, the study of sections on Chemistry and either Physics or Nutrition. The latter subject will presumably be the one usually taken by girls.

The syllabus suggested is a full one but seems reasonable. I do not propose to discuss the details, but I think that I should say something on the question of the organisation of a School Certificate course in General Science. There are two main methods:—

1. To attempt to treat General Science as one subject, using as text-book one of those which have been written for this purpose.

2. To treat the subject under the three headings of Biology, Chemistry and Physics, linking these branches where the opportunity occurs.

As far as the 'core' science is concerned the first method should be satisfactory as the treatment will not go far enough to be complex. But, for the General Science option for School Certificate, I am, personally, very strongly in favour of the treatment of the subject as separate branches. This method is, I consider, essential to produce the logical development which is necessary for the teaching to have real value, and to provide the foundation for further study which some pupils will need. I learned recently that this has been the decision also of a sub-committee of the English Science Masters' Association appointed to investigate the content and teaching of General Science.

My own preference is for the following arrangement of the General Science option:—

In the first year (third forms) the greater part of the time should be devoted to Biology, the rest of the time being spent in a short introductory course of Physical Measurements and use of apparatus.

In the second and subsequent years (fourth and fifth forms) the Chemistry and Physics should be studied with occassional reference to and revision of Biology when opportunity occurs.

The reasons for my preference are these:—

1. Biology is a more suitable study for the first year pupils than Chemistry and Physics. It is less theoretical and its study, particularly the field-work has a great appeal for the young pupil. Also, and this is a most important point, the study of Biology furnishes a natural and easy approach to the question of sex instruction, which, the Consultative Committee considers, should be at least part the responsibility of the schools until the time is reached when the home is giving all the instruction needed.

2. The General Science option requires no biology additional to what is in the 'core' science. This can be adequately covered in the one year's study leaving the later years practically free for an effective course of Chemistry and Physics.

I wish to emphasize that this method of arranging the General Science is certainly not the only one possible and other teachers may prefer other arrangements.

As regards the other options it is fitting here to make some reference to the Chemistry. In drawing up a suggested syllabus the Committee stated its aims as follows:—

"The prescription in this subject has been planned to include the elements of both inorganic and organic chemistry, in order that pupils leaving school at the end of the School Certificate Course may have a reasonable knowledge of those principles of chemistry affecting their daily lives, while those continuing to University Entrance may have a sound foundation upon which to base their study of other science subjects, or their further study of chemistry. The treatment is expected to be on practical lines throughout, with constant attention to the practical applications of chemistry to daily life and to industry."

A copy of this syllabus was made available to this Branch before the report appeared in print. The Branch set up a committee to consider the prescription. The committee agreed on some suggestions for alterations and these were forwarded to the Education Department. Since then, a revised syllabus has been prepared by the Department. As far as I know, this is likely to be practically final. It satisfies almost all of the requests for alteration made by our committee.

One point in this syllabus will certainly interest some of our members. It is required that in order to appreciate the importance of chemistry and chemical research to society, and to see the type of problems which arise in chemical processes on a large scale, direct contact will be made with at least one local industry or with local agriculture. Such contact may be with an established process or with research. It is not intended that this section should be tested in an examination paper.

From the point of view of the education of the pupil, visits to industries are certainly interesting and valuable. But I do not know what the industries themselves will think of this plan. If they are willing to co-operate there will be need for organisation to ensure that the visits are distributed in such a way that they do not prove too much of a nuisance to the firms or departments concerned."

REFRESHER COURSE AT CANTERBURY COLLEGE.

The following lectures will be given by members of the Chemistry Department staff during the winter term.

Lectures I—IV. Classical and Modern Theories of Rate Processes. Chain Reactions and Explosive Reactions.

Lectures V—VIII. Electronic Theory of Organic Substitution and Addition Reactions.

Lectures IX—XI. Crystal Chemistry.

PERSONAL NOTES.

Dr. H. C. Holland is leaving the Branch on his appointment as manager for the firm of W. Sutherland & Co., Auckland. Fortunately his services will not be lost to the Institute, and Canterbury Members wish him well in his new post and as an Auckland Branch Member.

OTAGO.

The new chairman, Mr. H. L. Longbottom is an Australian by birth and education, studying first at Perth Technical School and then, as an extra-mural student at Adelaide University. In 1916 he went to England as a chemist with the Ministry of Munitions, working on cordite at Gretna and mustard gas at Avonmouth. He was Tanning Survey Chemist for the C.S.I.R. in Perth in 1919, and joined the tanning firm of Messrs. Michaelis Hallenstein & Co. in Melbourne in 1921, first as Assistant Chemist, and later as Chief Chemist and Manager of the Gelatine and Glue Factory. He graduated B.Sc. (Melb.) in 1922, and A.A.C.I. in 1924. Mr Longbottom is now Managing Director of Glendermid Ltd., an associate of the Victorian firm. Since coming to Dunedin he has interested himself in manufacturers' affairs and was President of the Dunedin Manufacturers' Association for a term. He has served for three years as an Officer of the Air Training Corps.

CHAIRMAN'S ADDRESS.

Before the April Meeting, the Otago Branch entertained Mr. L. H. James, Government Analyst, at a complimentary dinner, prior to his departure for Wellington. Following the dinner Mr. Longbottom gave his Presidential Address on the

Relationship of Chemists and Chemistry to the Community and Industry.

While chemistry has played a vital role in the war effort, it is quite reasonable to expect that in the post-war reconstruction of industry, chemists must continue to exert an ever increasing influence. A lot of the research previously directed to destruction will be diverted to the use of humanity.

Despite the talk of the "grand new post-war world," while there will be a new spirit abroad and adaptations for the benefit of mankind, there will not be any fundamental change in, nor will there be freedom from war in the future. Already nations are jockeying for geographic and economic advantages.

While our democratic way of life, and our industrial organization based on private enterprise may not be a perfect system, it is fundamentally sound. The British Empire met the challenge of such a highly industrialized and well-prepared nation as Germany. Had there been in 1939 the same absence of trained industrial chemists as in 1914, it is doubtful if we could have survived. In 1939 I.C.I., and similar English and Colonial firms gave us the reserve of trained chemists who have played such an important part on the industrial front. Only through private enterprise and a sound industrial development is such possible. We must settle down immediately to the pre-war basis of organization of society. While evolutionary changes will certainly occur, any thought of a complete new order must result in chaos.

War-time and self-preservation greatly stimulates research. There will be marked development in old and the establishment of many new industries. In this war, England has increased her agricultural production, New Zealand, her manufactures. This diversification of industries is a check on future wars. The unpreparedness of other nations stimulated the Nazi attack. Manufacturing firms are realizing the need of decentralization to both other towns and other countries. Recently there was intimation of a Rayon manufacturer investigating the possibility of production in New Zealand. (He was in Dunedin last month—Branch Editor). The trend to-day is elimination of waste. Mechanical devices are replacing labour—e.g. one man on a bull-dozer equals twenty with shovels. This means an increasing demand for industrial chemists.

Is the present educational system best suited for training industrial chemists? Our graduate of 21/22 has leaned on his teachers for guidance, on his family for support. His study has been varied; his contacts have been of one type. Such a glass house graduate is more likely to succeed in the seclusion of University or Government life than in industrial turmoil.

The ratio of Government to industrial chemists to day is 9 to 7. If the Government offers a more secure and serene life, industry will, by the law of supply and demand, offer higher salaries.

To his firm, the fledgling industrial chemist is worth less than the office boy. Workmen suspect and resent him; foremen, etc, may be passive and unhelpful. Should our Graduate assert his University superiority, the result is disastrous. He must realize experience gives an uncanny knowledge and real intuition. Again, factories deal not in test-tube quantities but in tons. This leads to differing results in the laboratory and on the production belt. Yet industrial life has its rewards. The only way to learn about an industry is to be a workman. A trained mind learns quickly. Although the graduate uses little of the actual subject-matter of his degree course, he has what is important—the scientific approach.

The university by introducing Industrial Chemistry as a degree subject, and also the C.U.C. course in Chemical Engineering recognized that the present curriculum is not perfect. England and Australia realized this years ago. Otago's endeavour to foster a closer link between the Chemistry Dept. and industry is praiseworthy. Unfortunately the only training in New Zealand for industrial chemists is at the University. Many Australian industrial chemists and high executives began in works as juniors, and learned their science and technology mostly at Technical School night classes. Our Institute should consider very seriously the question of better facilities for those in factories to study scientific subjects. If there is little hope of such classes in Technical Schools, perhaps the University could hold extension classes for evening students. Young men of real ability should be able to get the necessary education to develop that ability to the fullest extent. A reservoir of skilled industrialists is a potential source of national strength in peace and war. The real wealth of any community is in its productive capacity. This depends largely on skilled operatives and technicians.

Since scientific control of production has recently increased markedly, and will continue to do so, unless we have many young industrial chemists our industries will perish. While the degree course gives an excellent training in chemistry, diversity of industries raises a considerable problem the metamorphosis of the brilliant academician into the industrial magnate. Comment has been made on the high salaries of lawyers and accountants as compared with chemists. Perhaps this is because the former during their academic training are engaged on the practical side as well. This gives the accountant an advantage over the chemists, who later join perhaps the same firm as a veritable tyro. A science course is as good

as any foundation for an industrial career, but it is only the foundation.

To improve our status, we must use the devices of propaganda. Such events as the recent conversazione of the Otago Chemistry Dept. showed the public their vast debt to chemistry. Not enough is made of opportunities. Lack of recognition is largely our own fault. Bodies such as the Graduates Association, and the Court of Convocation must become alive. If chemists and other graduates will not interest themselves in their own affairs, they can hardly blame the community for underestimating their worth.

POST GRADUATE COURSE OF LECTURES IN CHEMISTRY AT OTAGO UNIVERSITY.

The following course of lectures will be given by the staff of the Department of Chemistry on Friday evenings during the Winter Term at 6.45 — 7.45 p.m.

Modern physico-chemical theory of atom and molecule.

June 1st .. The physical picture of the atom. Sub-atomic particles. Radioactive indicators.
June 8th .. Wave theory of atom. Molecular spectra.
June 15th .. Molecular size. Mono molecular films.
June 22nd .. Modern theory of valency.
June 29th .. Bivalent hydrogen, tautomerism.
July 6th .. Introduction to the electronic theory of organic reactions.

Modern methods in Chemistry.

July 13th .. Micro technique.
July 20th .. Indicators in volumetric analysis.
July 27th .. Distillation.
August 3rd .. Polarography.
August 10th .. Absorption spectrophotometry.

CORRESPONDENCE.

The Editor,
J.N.Z.I.C. 7th March, 1945

Training of Chemists for Industry.

Dear Sir,

From time to time we have our members write on types of training students should follow in learning the science of Chemistry in a manner suitable for its application in the field of industry.

Industrial chemistry and applied chemistry have had supporters, also some rather more vague suggestions.

Following 30 years of experience as an executive chemist in industry I would like to stress the desirability of accepting

the guidance, experience and recommendations of the older countries, and preferably adopt an identical course of training.

The recent newspaper article of Dr. Andrews clearly indicates the mission and purpose of science in modern life. His own progress in the profession is an inspiration for students as to the breadth and extent to which the would be scientist should qualify. In a paper read by Mr. H. H. Edwards of Auckland, and published in last issue of the Journal, Mr. Edwards strongly urges the need for trained Chemical Engineerrs. He is perfectly right. Chemical Engineering is the answer to the training problem. Graduates in science are far from being adequately equipped when seeking openings in industry.

If they do get into factories as chemists and analysts they are likely to be leg roped to these jobs for life without a prelimary knowledge of engineering, unit processes, management and business.

Chemical Engineering provides all these and a sound knowledge of chemistry and physics in addition.

The British Institute of Chemical Engineers has just issued a 28 page booklet dealing with a scheme for a degree course in Chemical Engineering.

An outline of subjects suggested are enclosed hereunder—

(for B. Chem. Eng.) First Year	
1. Mathematics	140 hours
2. Mechanics	140 „
3. Chemistry	280 „
4. Physics	280 „
5. Engineering Drawing	160 „
Total	1000 hours

Second & Third Years			
1. Mathematics.	200	— 350	hours
2. Chemistry (Inorganic)			
3. „ (Physical)	800	— 700	„
4. „ (Organic)			
5. Strength & Elasticity of materials & theory of structures.			
6. Mechanics of fluids.	450	— 550	„
7. Heat Engines.			
8. Mechanisms.			
9. Electrical Technology.	120	— 150	„
10. Physical metallurgy.	30	— 50	„
11. Fuels and combustion.	100	— 50	„
12. Engineering drawing & design.	300	— 150	„
Total	2000		hours

Fourth Year

1. Unit operations of Chemical Engineering	=	400	hours
2. Chemical Plant Design & Drawing office Practice	=	300	„
3. Heat Transmission	=	60	„
4. Materials of Construction	=	60	„
5. Transport & storage of materials	=	30	„
6. Power generation & Distribution	=	30	„
7. Surveying, factory layout & construction	=	40	„
8. Factory organisation & management	=	20	„
9. Special lectures	=	30	„
10. Works visits	=	30	„
	Total	1000	hours

In addition it is considered obligatory for students during vacations to utilise facilities for familiarizing themselves with works practice.

Training also includes report writing in a clear manner and in good English.

The Scheme goes very fully into a detailed outline of each section of the proposed course, explaining reasons for everything suggested.

It is the outcome of vast experience by an exceptionally strong body of Great Britain's leading scientists and lettered Industrialists.

A copy of the proposed Degree Course of Chemical Engineering should be in the hands of our Institute Executives, with a view to bringing it to the notice of our University Faculty.

Yours faithfully,

E. LEESE.

F.N.Z.I.C. M.I. Chem. E

Mr. Leese's letter shows that we have failed to publicise sufficiently the introduction of a degree course in chemical engineering by the New Zealand University, the necessary authority having been granted by the Senate in January 1944. The course is given in the N.Z. University Calendar 1945, and leads to the double degree of B.Sc. and B. E. (Chem.). At Canterbury College one student is now in the fourth year of the course, having transferred from mechanical engineering, and two have begun the course this year. A college Diploma in Industrial Chemistry is also available, two students (both now in the Army) having completed it last February. A unit in applied chemistry has also been added to the B.Sc. degree.

Ed.

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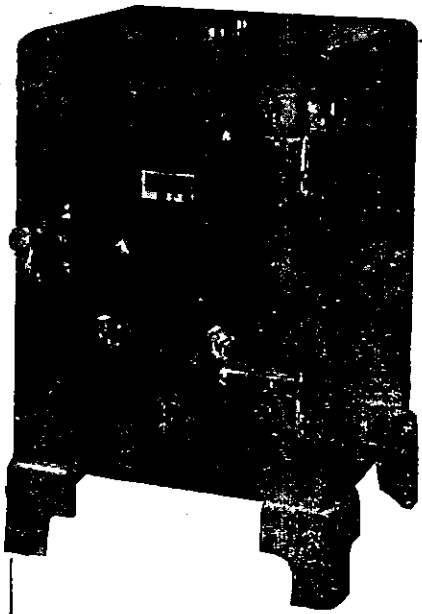

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