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EDITORIAL.

The coming of Winter in Europe and the possibility of famine and disease underline the wisdom of the statement of Dr. J. C. Andrews "if the aims expressed by the Hot Springs Conference of 1943 are to be achieved to any degree, there must be a great expansion of the food processing industry, and to this end it will be profitable for a continuance and expansion of research in these fields to be actively pursued." We are however surprised to find that he considers that a University Chair of Food Technology is the correct method of approach to the problem.

A Research Institute seems to be what is called for. A food technologist requires presumably a knowledge of chemistry, biology and engineering, and in his university course will obtain such knowledge in the appropriate departments. Just what a Professor of Food Technology would teach we fail to see. We suspect that he would be an "integrator," and of such we confess to a frank scepticism. In pursuit of information, we have considered an article in "Food Industries" of May last on "What it takes to be a Food Technologist," in which the course offered at Michigan State College is outlined. The course "is largely an integration (sic. Ed.) of basic or fundamental subjects selected from the curricula of the schools of agriculture, engineering and arts and science, plus the addition of ten new subjects selected specially for the food technologist." In the freshman (first) year, we note General Chemistry as one of ten subjects. Another is Effective Living. The sophormore (second) year includes Quantitative Analysis and Biological Chemistry, also History of Civilisation. Physical Chemistry appears in the junior (third) year with Selection and Preparation of Meats for Processing. Among a long list of "elective" subjects, we note Business Speaking, Ice Cream Manufacture, Mammalian Anatomy and Marketing of Poultry. All these no doubt are worthy subjects of study, but hardly in a University.

We are far from suggesting that a course proposed to the New Zealand University would be of this kind. What we do

suggest is that the fundamental subjects which a future food technologist requires, and which are appropriate to a University are already available in the University. The specialist study he will need belongs to post-graduate work in a research institute. The case for establishing such an institute is certainly a strong one.

ANNUAL GENERAL MEETING, 1945.

The General Meeting held at Palmerston North during the Annual Conference in August was referred to briefly in the September Journal. An abstract of the minutes is now available and is published for the information of those members who were unable to attend.

Present:—Dr. J. C. Andrews, President, in the chair, and an attendance of about 120 members.

Apologies:—Apologies were recorded for Dr. Askew, Dr. Holland, Messrs. Abel, Allison, Bathurst, Blick, Dingley, Dearsley, H. H. Edwards, S. H. Edwards, Freyberger, Fraser, D. J., Professor Elizabeth Gregory, Messrs. Jackson, Law, Martin, G. F., Morgan, Pain, Williamson and Elphick, B.L.

President's Remarks:—The President gave an outline of the activities of the Council and Members during the war:—

"At the beginning of 1939 the membership was 179 and now it had risen to 270, including 58 Fellows. Many had occupied prominent positions. Sir Theodore Rigg was elected Chairman of the Council for Scientific and Industrial Research and Professor Soper Chairman of the Chemical Panel, Defence Scientific Advisory Committee. Dr. Page had been elected to the Cawthron Trust Board. Dr. Holland was elected to the Canterbury College Council and Mr. D. F. Sandys Wunsch to the Council for Scientific and Industrial Research.

Three members had lost their lives on active service. (Members paid tribute by standing in silence.)

Miss A. E. Lorimer had received the M.B.E. for her services in the Middle East and in India, and Mr. R. Hurst had been awarded the George Medal for bomb disposal work.

The Royal Institute of Chemistry:—Very real assistance had been received from the Royal Institute of Chemistry during the year and there had been excellent co-operation in all matters with the New Zealand Section. As an example he could quote the formation of the Chemists' Employment Committee and the setting up of the Employment Register which was now functioning.

Individual Assistance:—Dr. Andrews said that the Institute appreciated assistance given by individual members and he would like particularly to mention Mr. Joiner for his design

work, Mr. M. L. Stewart for his work as representative of the Institute on various Standards Institute Committees, and the members of the Medical Advertisements sub-committee. Above all, the Institute was greatly indebted to Dr. Dixon for his work in connection with salaries questions and other matters.

Recognition of Institute Qualifications:—Dr. Andrews said that he was pleased to announce that the Public Service Commissioner had formally recognised the A.N.Z.I.C. and the Laboratory Assistant's Certificate, as standards of qualification for the Civil Service, the former as a qualification equal to that of a degree and the latter by granting the concession of a double rise. Five candidates have applied to sit the latter examination this year.

Secretarial Work of the Institute:—Dr. Andrews then referred to the onerous duties which had been placed on the Honorary General Secretary through the increasing activities of the Institute. Although an Assistant Secretary had been appointed the expansion of advertising in the Journal and the setting up of the Chemists' Employment Committee had so much increased the secretarial work that the Hon. General Secretary had been afforded very little relief. The President had, therefore, prepared a financial review of the Institute so that ways and means could be examined whereby paid full-time secretarial assistance could be obtained. This review had been circulated to the members present and he hoped they would contribute some discussion.

The matter of increasing the income of the Institute must necessarily be an important point as there would no doubt be further commitments in the future such as the procurement of a Charter and the setting up of a Benevolent Fund as well as the paid secretarial assistance.

In the past the Department of Scientific and Industrial Research had provided many facilities and privileges and in particular the Director of the Dominion Laboratory had provided office accommodation.

The President then threw the meeting open for general discussion.

Mr. Spackman said he considered that the procurement of a Charter should be proceeded with as soon as possible and this had always been considered an aim of the Auckland Branch. The probable cost based on an estimate of several years ago would be about £50.

Dr. Dixon drew the attention of the meeting to an advertisement by the P.S.C. for "Chemists" whereas "Pharmacists" had actually been required . It was decided to recommend to Council to write to the P.S.C. drawing his attention to a former undertaking to use the word "Pharmacist" in such advertise-

ments and to retain the word "Chemist" for analytical chemists:

Professor Worley congratulated the Institute on its activities and suggested that many firms would be prepared, if approached, to make donations to the Institute and this would be an easy source of money.

Mr. Stewart supported Professor Worley's remarks and said that firms would be very willing to make donations once they realised the work of the Institute, e.g., Medical Advertisements sub-committee, etc.

The President said he wished to clarify the position regarding donations. The Commissioner of Taxes had refused to allow such donations to be deducted from company income for purposes of income tax.

Dr. Dixon referred to a newspaper report suggesting that the Government would allow grants to research funds to be free of income tax.

Mr. Freeman said that another Institute was able to convince the Commissioner of Taxes that their services were of use to particular firms and on this showing the firms were allowed to make donations, free of income tax deductions up to £100.

Mr. Parr said that the subscriptions should be proportionate to the services rendered by the Institute. Fellows should be prepared to accept a greater subscription for the honour of being a Fellow. Many members no doubt would be prepared to make donations provided such were placed in a capital account.

Mr. McIntosh said he thought most Associates would be in favour of an increase in the subscription.

Dr. Burns felt he would have to object to an increase on the grounds that, as Canterbury delegate some years ago he had obtained the support of his Branch to the last increase for some years. He thought other methods of financing might be adopted such as Life Membership a portion of which could be transferred to the current account to overcome difficulties.

Professor Worley and Dr. Parton moved and seconded:—

That it be a recommendation to Council to approach the Income Tax Commissioner to ask that donations to the Institute from firms be made from operating expenses and not from profits and thus be free from income tax.

Carried.

Mr. Woolman and Mr. Brooker moved and seconded:—

That the terms "subscription" and "donation" be investigated for legal meaning as regards liability to Income Taxation.

Carried.

Mr. Longbottom raised the point that there should be some form of membership whereby companies could pay subscriptions.

Mr. Nash supported this point and said that firms would be able to pay for services rendered by the Institute if such were available.

Mr. Spackman said that the Institute existed for the benefit of members and it was up to them to do the necessary spade work.

Dr. Shorland put forward the suggestion that the Institute should, in keeping with overseas standards, maintain the highest possible standard by selection for the Conference of only those lecturers who would make an original contribution to world knowledge or who could summarise or interpret existing knowledge more adequately than the existing information. He thought that research should be expanded and not be a secondary consideration as at present. The Universities should be asked to describe at future Conferences research work carried out during the last ten years and one lecture should be devoted to the work of a New Zealand Chemist who made an important contribution to fundamental knowledge.

It was also suggested that there should be a register of Laboratories and of the work proceeding in each.

Mr. P. D. de la Mare said that he supported Dr. Shorland's remarks and referred to the fact that one of the lecturers had felt it necessary to apologise for introducing some pure chemistry. He thought that such an apology was entirely unnecessary.

The President explained that the meeting's recommendations would be considered by Council and decisions would be notified through Branch Committees.

Greetings:—Professor Worley stated that greetings should be forwarded from Conference to the first President of the Institute, Professor W. P. Evans.

The President referred to the loss of Dr. H. G. Denham and the great debt the Institute had owed to his support. As a mark of respect the members stood in silence.

Mr. Keys suggested that the Institute should send messages of sympathy to those who had lost, in the war, next-of-kin who had been members of the Institute.

Employment Register:—In answer to an enquiry from Mr. Hullett as to the qualifications entitling a person to join the Employment Register, the President explained that the qualifications were membership of either the New Zealand Institute of Chemistry (including Local members) or of the Royal Institute of Chemistry.

Mr. Hullett and Dr. Annett moved and seconded:—
That Council be recommended to give consideration to assisting returned servicemen who are not qualified as above. Carried.

Mr. Nash said that provision should also be made for those chemists who had been sent to Australia and who had not had a chance of joining the Institute prior to their departure.

Mr. Chamberlain and Dr. Annett moved and seconded:—
That members of the Institute place on record their appreciation of the work of the officers of the Institute and particularly that of Mr. W. G. Hughson. Carried.

The President and Mr. Hughson moved and seconded:—
That on this, the first, Conference to be held since the cessation of hostilities the Institute in collaboration with the New Zealand Section of R.I.C. send a cable of Greetings to the Royal Institute of Chemistry of Great Britain and Ireland. Carried.

Abstract of Minutes of the Annual Meeting of Council-in-Person of the New Zealand Institute of Chemistry

held in the lounge of the Midland Hotel, Palmerston North, on 30th August, 1945, at 2 p.m.

Present:—Dr. J. C. Andrews, President (in the Chair), Professor F. G. Soper, Vice-President; Mr. K. M. Griffin, Auckland Delegate; Mr. D. H. Freeman, Wellington Delegate; Mr. F. H. G. Johnstone, Canterbury Delegate; Dr. S. N. Slater, Otago Delegate; Mr. L. Wilkinson, Assistant Secretary; Mr. W. G. Hughson, Hon. General Secretary-Treasurer.

Also present by invitation:—Dr. J. K. Dixon, Canterbury Proxy; Mr. L. H. James, Otago Proxy; Dr. L. H. Briggs, Membership Committee; Dr. H. N. Parton, Editor of the Journal.

Apologies were received from Sir Theodore Rigg and Mr. G. A. Lawrence, Trustees to the Reserve Account, from Dr. R. Gardner of the Membership Committee and from Mr. P. White, Auckland Proxy. It was regretted that Mr. W. Donovan of the Membership Committee was not able to attend Conference.

Fellowship Rule:—After a full discussion it was decided that the proposed Rule read the same as the Royal Institute's Rule with the substitution of "Membership Committee" for "Council."

The rule will be numbered 9.1.4. and will read as follows:—
or 9.1.4. having been engaged in important analytical, industrial, consulting or other work of a general or specialised character, are, in the opinion of the Membership Committee possessed of sufficient knowledge and ability.

Election of Fellows:—Mr. Griffin pointed out that communications relevant to the election of Fellows were strictly confidential to Council and to the Membership Committee. Such matters did not, therefore appear on the agenda and delegates frequently did not know what elections were under consideration. It was agreed that information relating to the election of Fellows should be circulated to delegates and proxies but not to members of Branch Committees.

Dr. Dixon said that proxies would appreciate a definite direction from the delegate or from the Branch as to how it wished to vote on the various matters appearing on the agenda.

Election of Fellows Direct:—Mr. Griffin said that the Auckland Branch felt very strongly that new members joining the Institute should first become Associates and not Fellows direct.

The President and Vice-President thought that the principle was sound and should be followed as far as possible but that cases would have to be considered on their individual merits and we should encourage all chemists in New Zealand to join our Institute and should avoid setting up antagonisms or divisions between groups of chemists.

Chemists' Employment Committee:—Mr. Wilkinson reported that the Committee had met the previous evening. A summary of the work accomplished and proceeding was given. Twenty-eight names were on the Register and three circular letters had been forwarded to them. Negotiations for further publicity were being taken up with the N.Z. Manufacturers' Federation.

Financial:—The financial review of the President was before the meeting. He pointed out that the attitude of the General Meeting was predominantly in the direction of raising the annual subscriptions of Fellows and Associates in order to obtain a guaranteed increase in the annual income. Amounts received from firms would not necessarily be regular and should be placed to a special account.

After a general discussion on the necessity for, and ways and means of obtaining, paid secretarial assistance, it was decided that the General Secretary should interview the Auditors or other suitable persons and investigate the possibility of engaging a firm of reliable accountants to act as the registered office of the Institute with perhaps a junior partner to act as Registrar to the Institute.

Increase of Subscriptions:—It was pointed out that the raising of the subscriptions to compare with subscriptions to the British Institute would bring in annually about £170 extra, i.e. raising the Associate subscription from £1.1.0 to £1.11.6 and the Fellowship subscription from £1.1.0 to £2.2.0.

It was decided that branches be asked to consider the matter of raising the annual subscriptions of members to one and a half guineas for Associates and two guineas for Fellows in order to increase the annual income by an amount sufficient to obtain paid secretarial assistance for the greatly increased work of the Institute.

Entrance Fees:—The whole question of entrance fees was discussed and the following points noted:—

1. Election of members involves a considerable expenditure of secretarial time, the time of an honorary Membership Committee and of the Branch Committees.
2. Preparation of Certificates, entrance forms, postage, seals, etc. all involve expense.
3. Fellows are assumed to be in a better financial position than Associates and many have expressed themselves willing to make a special contribution to the funds of the Institute.
4. Associates are not elected until they have one or two years' experience, i.e. they are in receipt of a salary and the Entrance fee would be justified on the one ground alone, that the Institute has done a great deal to safeguard that salary and the status of the Chemist.
5. Any entrance fee should be regarded as a special payment made only once in a lifetime and should go to a special reserve account.
6. These proposals will not effect students or local members.

Branches are to be asked to consider a proposal by Council that persons elected to the membership of the Institute pay an entrance fee on the following basis:—

Associates	£1. 1. 0.
Fellows elected via the Associateship ..	£2. 2. 0.
Fellows elected direct	£3. 3. 0.

and that present members of the Institute be given the opportunity of contributing voluntarily to the funds by paying a retrospective entrance fee.

Branches should consider whether the retrospective entrance fee should be voluntary or compulsory.

Journal:—Dr. Parton reported briefly on recent increases in the number of pages, the number of advertisements, and the number of copies per issue.

He did not consider a reduction in size of type would be of any great advantage as the cost is proportional to the time of setting up.

Annual Conference:—Council members unanimously affirmed that the first Annual Conference held since the cessation of hostilities had been an unqualified success.

Council agreed that the Conference be held annually at

the same time of year (August holidays) and that it be a suggestion to the incoming Council to hold the 1946 Conference in Nelson.

The Secretary said that a number of suggestions had been made relative to the general organisation of future conferences. These suggestions will be referred to the conference committee and recorded for the incoming conference committee.

BRANCH NOTES

AUCKLAND BRANCH.

At the meeting held on August 9th, a series of short papers were presented. The first was by Mr. J. S. Dacre, B.Sc. on "Chromatographic Analysis", with particular application to the pigments of the bark of Coprosma Species. The speaker pointed out that Chromatography was the ultima thule of analysis, in that substances could actually be cut apart with a knife. The method has been used, with MgO as the absorbent to purify and identify anthraquinones in the bark of Coprosma australis (formerly grandifolia) and aerclata. Two new compounds were found, beta-morindine and omega-hydroxymorindone.

The second speaker was Mr. G. W. Stace who discussed the methods for the determination of iodine in iodised salt and their application to the determination of the loss of iodine from the salt due to absorption on the bag or carton, and also to the unequal distribution of iodine through the package due to unexplained changes after packaging. These changes were not noted in salt packed in glass containers.

Mr. A. P. Oliver, B.Sc. then gave a paper on the determination of Vitamin A with the spectrophotometer. He outlined the working of the instrument and illustrated with lantern slides the photographs obtained. Results agreeing within 2% should be regularly obtained with such an instrument. Mr. Oliver pointed out the need for a more satisfactory standard than the present 6 gamma of beta Carotene, as it is doubtful whether one molecule of beta carotene gives rise in the human body to 1 or 2 molecules of Vitamin A or some intermediate amount.

The last topic of Boiler Feed Water was taken by Mr. P. R. Parr M.Sc. who outlined the trisodiumphosphate process used at Westfield Freezing Works to remove scale from the boiler tubes, and to keep them free from scale. Mr. E. H. Schache also gave a brief address on a boiler at the Reid Rubber Mills in which corrosion was prevented by the addition of magnesium sulphate to the feed water, so that a slight protecting scale was formed.

The meeting on September 6th was given up to students' papers. Mr. R. O. Farrelly, B.Sc. discussed complex ion formation in zinc salts. The activity co-efficients of zinc nitrate and zinc perchlorate are very near those of the corresponding magnesium salts, and hence these salts of zinc may be considered to be normal. However the halides of zinc show a marked abnormality, increasing in the order iodide, bromide and chloride. The abnormality may be due to incomplete dissociation or to complex ion formation. From a study of the vapour pressure lowering of these salts, from conductivity titrations of zinc halide with corresponding potassium halide, and potentiometric titrations of zinc halide with potassium halide, it was shown unequivocally that the cause of the abnormality was complex ion formation. Furthermore it was shown that the formula of these complex ions was $[ZnX_4]''$. Incidentally it was shown that the cause of the abnormality of cobalt chloride as evidenced by its well-known change of colour, is probably due, not to complex formation, as is often assumed, but to some more complicated cause, very probably changes in ionic hydration.

Mr. W. E. Harvey, B.Sc. gave an account of a new glucosidic alkaloid, solmargine, $C_{40}H_{63}O_{13}N$. This had been hydrolysed to the aglycone solmargidine $C_{28}H_{45}O_4N$ together with glucose and rhamnose. The aglycone had been shown to be a sterol with one double bond (by bromination) and containing the usual 3-oxy group and 10 methyl group in the cis position (by formation of digitonide). The nitrogen atom was basic and probably a carbinol amine, while micro hydroxyl determinations showed that all the oxygen atoms were present as oxy groups. A periodic acid oxidation showed that two of these formed a 1:2 glycol grouping. Solmargidine had been dehydrated and work was proceeding on the dehydrated compound.

Mr. W. I. Taylor, B.Sc. spoke on a fractionating column built especially for the purpose of studying essential oils, and dwelt on the analysis of the essential oil of Dacrydium Kirkii with special reference to the method of elucidation of the individual components. The column was 90cm. long and packed with twisted brass gauze 5mm wide, has 27 theoretical plates, an operating holdup of 2.3ml. and a throughput of 2ml per hour. Pinene, myrcene, limonene, bornyl esters, sobrerol, cadinene, a solid sesquiterpene alcohol and phyllocladene were identified and the presence of two terpenes, a sesquiterpene and a sesquiterpene alcohol shown.

WELLINGTON BRANCH.

During the year it was decided to institute an annual lecture to the memory of the late Dr. J. W. Mellor, to be known as the "Mellor Memorial Lecture," and at the August meeting, Mr. W. Donovan delivered the inaugural address, his subject being, "Joseph William Mellor, C.B.E., D.Sc., F.R.S.—his Life and Work."

Mr. Donovan said that J. W. Mellor was one of the most distinguished of New Zealand's University Graduates, perhaps the most distinguished of all in Chemistry. He attained international status as an authority in ceramic research, and as an author laid the whole of the English-speaking world under tribute for his works on theoretical and inorganic chemistry. Born near Huddersfield, Yorkshire in 1869, Mellor came with his parents to New Zealand at the age of ten. When only thirteen, he left school and commenced work in a boot factory in Dunedin. He enrolled as a pupil of the Dunedin Technical School on its foundation in 1889, and by his ability soon gained the interest of the Superintendent, Mr. S. M. Thompson. He matriculated in 1892, at the age of twenty three. He was awarded a bursary at the Otago University, was granted time off by his employers to attend lectures, and from that time never looked back. In 1897, he graduated B.Sc. gaining the Senior Scholarship in Chemistry for that year, in 1898 obtained first class honours in Chemistry, and in 1899 was awarded an 1851 Exhibition Scholarship. This was taken up at Owens College, Manchester, under the direction of H. B. Dixon and his associate W. H. Perkin, both brilliant research men and excellent teachers. Under Perkin he synthesised and examined the alkyl derivatives of glutaric, adipic, and pimelic acids. But his chief research was the combination of hydrogen and chlorine, as suggested by Dixon. He confirmed the catalytic effect of water vapour, as observed by Baker, studied the period of induction associated with the combination of the gases, inivestigated the effect of temperature, and the activity of chlorine on exposure to light. The researches were published in a series of papers in the Journal of the Chemical Society.

He completed his D.Sc. New Zealand, in 1902. His interest in ceramics was largely fortuitons. Appointed Science Master at the High School, Newcastle-under-Lyme, Staffordshire, questions put by sons of potters aroused his interest in ceramics and ultimately directed his activities into the ceramic field.

In 1914 the Pottery School of the North Staffordshire Technical College was established, largely through his own efforts, and he was appointed Principal. He was an excellent teacher, and his own early struggles made him appreciative of the difficulties of evening students. The laboratories of the

school became world famous.

During the Great War, 1914-18, Dr. Mellor was called to assist the Iron and Steel Industry in the vital provision of refractory furnace linings, supplies from Germany having been cut off. His success was such that when in 1919 the British Refractories Research Association was established, he was appointed Director. The Laboratories were at Shelton, Stoke-on-Trent, and he was able also to continue as Principal of the Pottery School. In 1928 he was elected a Fellow of the Royal Society. He represented New Zealand on the Governing Body of the Imperial College of Science and Technology for several years. He was awarded the honour of C.B.E. shortly before his death on May 24th, 1938.

His name will always be associated with the Ceramic Society, which he joined in 1905, being elected Secretary, and continuing in that position until his death. He found it a purely local Association. He made it an Institution of world-wide repute. A feature of the Society were the frequent tours of the members as a body to several continental countries in turn, such as Holland, Denmark, Sweden, Czechoslavakia, and also across the Atlantic to the United States. Dr. Mellor was a frequent and valued contributor to the Journal of the Ceramic Society. A fundamental examination into the Chemical Constitution of the Clay Molecule, begun in 1910, was continued throughout his life. Six papers were published on this subject. Numerous contributions dealt with research on pottery glazes, and two papers, published in 1934-35, gained world-wide appreciation, being translated in extenso and appearing in many foreign journals. These were "The Glazing and Peeling of Glazes," and "The Durability of Pottery Frits, Glazes, and Enamels in Service." Mellor used and developed the petrographic examination of thin sections of ceramic ware.

His contributions to the knowledge of refractories were perhaps the most important of all, as the titles of the following papers would indicate:—"Texture of Firebricks," "Specific Heat of Firebricks at High Temperatures," "Action of Flue Dust on Firebricks." "The Effect of Loads on the Refractoriness of Fireclays," "The Standardisation of Tests for Refractory Materials."

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In all 113 papers were published in the Ceramic Journal by Mellor and associates. To great scientific attainments Dr. Mellor added unusual literary ability, and his work as an author was of the highest rank. Books published by him include:—

1. Higher Mathematics for Students of Chemistry and Physics. Issued in 1902, while at Owens College, it was printed several times, and a second edition published in 1926.

2. Chemical Statics and Dynamics, 1904.

3. "Treatise on Quantitive Inorganic Analysis, with Special Reference to Clays, Silicates, and Related Minerals." 1913. Second edition, 1939. Described by the reviewer in "The Analyst" as one of the best books on inorganic analysis ever written.

4. "Modern Inorganic Chemistry," 1917. The 9th edition, revised and edited by Parks, appeared in 1940.

5. "A Comprehensive Treatise on Inorganic and Theoretical Chemistry" in 16 volumes, 1920-1937, a monumental work. It must be examined for its value to be appreciated. The references to original work are as far as humanly possible, complete. Mellor had a perfect indexing system, and wrote every word and every reference himself. During the writing of the last four volumes he was a very sick man. The numerous classical, philosophic, and literary allusions scattered through all the books indicate that Mellor would have excelled in classics, literature and modern languages had he specialised in any of these.

A remarkable talent with the pencil is shown in an unusual type of book "Uncle Joe's Nonsense," 1934, which is profusely illustrated with original sketches. On his retirement from the position of Director, Refractories Research Association, in 1937 he was presented with a selection of books for his library, and the sum of £1500. He died the following year.

A Special Mellor Memorial Number of the Transactions of the Ceramic Society, published in 1939, records his career and achievements. It contains appreciations not only from British Refractory and Pottery Research Associations, but from Ceramic and kindred societies in United States, Canada, Belgium, Denmark, Sweden, Czechoslovakia, Germany, France, Holland, Italy, India and Japan. Many of these were personal, because of contacts made during visits to several of these countries, and from them all students had come to Mellor's laboratories. There is a concensus of opinion that Dr. Mellor was outstanding as a scientist, as a leader, and as a gentleman. New Zealand possesses a great variety and extent of clays, and a ceramic industry is being steadily built up in the Dominion.

This furnishes an additional reason why the memory of Mellor should be perpetuated, and the Wellington Branch of the N.Z. Institute of Chemistry is to be commended for the establishment of an Annual Lecture.

Two members of the branch, Messrs. D. A. Tait and L. S. Osgerby have left recently to gain further experience overseas.

Mr. G. Martin (Co-operative Rennet Co., Eltham) has transferred to this branch.

CANTERBURY BRANCH.

Mr. R. S. Jones, of New Zealand Insulators Ltd., spoke to a well attended meeting in June on "The Future of the Ceramic Industry in New Zealand," paying special attention to the economic aspects of the industry. The group of products from common red-brick clay, mainly building bricks and pipes, has been made successfully in New Zealand for many years and will continue to be a stable industry, with adequate raw materials and overseas competition almost nil, owing to the high rates of weight to value. The most important factors bearing on the success or failure of the New Zealand ceramic industry are as follows:—(1) the internal market; (2) the quality, quantity and cost of raw materials; (3) the skill, wage levels and training of workers; (4) efficiency of production and possibility of mechanisation; (5) technical knowledge and scientific control; (6) research; (7) protective tariffs and import restrictions.

Prior to the war, about £¾ million was spent on the ceramic products considered, pottery, electrical porcelain, refractories, tiles and sanitary ware. About one quarter was made locally, so room exists for expansion, some of which has now occurred. Most of the raw materials are available in New Zealand, but in small deposits, varying greatly in physical and chemical properties, and in purity. Demand is insufficient to warrant clay purification installations, and hence strict laboratory control of raw materials is essential. Broadly it can be said with regard to raw materials that quantity is satisfactor, quality sufficiently good for most purposes, and costs compare reasonably well with the cost of similar materials to overseas manufacturers.

The labour situation is not so satisfactory. It is not always realised that each wage increase without corresponding increase in the volume of production, raises costs and handicaps the industry's competitive power, and that when the labour market eases and management is free to employ whom it wishes, unsatisfactory workers will be the first to go. In the ceramics industry wages form the bulk of costs. The training

of skilled workers is also difficult in New Zealand. Mechanisation might dispense with the need for skill, but not for care. Losses due to careless handling are serious. Any programme of mechanisation should aim at using available labour to better advantage.

Mr. Jones discussed the current trend of research in the field, and stressed the fact that the needs of each manufacturer are highly individual. He thought that research in New Zealand would need to be individual also, owing to diversity of raw materials and production methods. The Principal of the North Staffordshire Technical College stated recently "when one weighed up the commercial value of information one got from collective research, one found that it was not nearly as remunerative as individual factory research."

Finally the speaker said that without protection by tariffs or import restrictions, the number of lines which could be placed on the market economically would be severely restricted. Industries such as ceramics which use local raw materials are worthy of all the protection that can be given, in preference to those importing their raw materials.

Dr. M. M. Burns continued the series on New Zealand Industry in July with a paper on "The Utilisation of Agricultural By-products." He confined himself to those materials produced as incidentals to the main products of cereal foodstuffs, apples, tobacco, butter and cheese, omitting the meat and wool industries, the former of which is fairly well developed as regards the utilisation of by-products. New Zealand is one of the major food exporting countries, with a combination of favourable climate, especially for pastoral industries, low internal market outlets, and high standard of farming efficiency. The last point is not as widely appreciated as it might be. The dairy production per cow and per acre is only slightly below such intensively developed countries as Denmark and the Netherlands, while the arable farmers of the South Island can probably be regarded as the most efficient in the world. Not that marked improvement is not possible—it is—and is likely to take place in the next few years. The fact that the farming standard is high is significant because the main reason why some by-products such as skim milk have not been extensively processed, has been the price paid by farmers for them as stock feed. It is doubtful whether they will be able to continue paying these prices.

The major primary products are butter, (300 million pounds of butterfat), cheese (80 million pounds) meat, wool and hides from 10 million lambs, 4½ million mature sheep, 1 million calves, 800,000 pigs and 700,000 cattle. The dairy in-

dustry belongs almost entirely to the North Island, the sheep industry is fairly evenly divided, and arable farming is concentrated in the 25-40 inch rainfall area of the South Island. 7-9 million bushels of wheat, 2½-3 million of oats, 1 million of barley and 100,000 tons of potatoes are produced. Horticultural crops are important in Auckland, Hawkes Bay, Nelson and Central Otago, but the only crop in which by-product processing may be possible is apples—3 million bushels per year. From this inadequate picture it is clear that only in the dairy and meat industries do there exist possibilities for major industries based on processing by-products. Others would necessarily be small.

Dr. Burns discussed first arable by-products. Such wastes are maize cobs, sugar cane bagasse, cereal straws, oat hulls, cannery waste, and spoiled fruit. Under research programmes stimulated by war, all plant waste can be treated to produce marketable by-products. The only limiting factors would seem to be (1) adequate supplies of raw material within workable distance of a central plant and (2) the cost of processing as compared with market returns for the product. Technical difficulties have become almost of secondary importance. After outlining the work of Lathrop and Dunning on the hydrolysis of ground corn cobs, sugar cane bagasse, oat hulls and linseed straw, the speaker discussed the possibilities of the application of their results in New Zealand. The major raw material would be cereal straw. About 100,000 tons is the probable annual production. Some 5,000 tons are baled for poultry producers and others, and a considerable amount is needed on the farms for covering down and for shelter. The remainder, say 80,000 tons is threshed with the header and either ploughed in or burnt. Burning makes subsequent working far easier, and gives for better weed destruction. Straw then is not wholly a waste product. It would cost the industrialist at least 30/- a ton without transport costs. There seems no great prospect of an industry based on straw, the one by-product of our arable areas produced in fair quantity.

Turning to horticultural products, Dr. Burns considered that discard apples may produce one or two small industries such as cider making, vinegar and pectin. Nicotine from the waste of the tobacco industry is promising.

The greatest source of industrially undeveloped by-products is in the dairy industry, which produces annually 500 million gallons of skim milk, 50 million gallons of buttermilk and 180 million gallons of whey. The bulk of these products is inefficiently fed to pigs and calves, a very minor amount is processed for dried skim, lactose and whey paste, and a large proportion is wasted. The pig is about the most efficient ani-

mal converter of milk protein to meat protein. Certainly it is only about 15% efficient—that is it takes about 7 pounds of milk protein to give one pound of meat protein. Filmer has calculated that we are wasting through our present use of skim milk and whey, total digestible nutrients equivalent to that contained in the whole of our annual production of lamb and cheese, and digestible proteins equal to twice that contained in the lamb and cheese. Dairy farmers tend to decrease the number of pigs as returns from butter or cheese increase, so the purchase of skim and whey by industrial concerns which would pay the equivalent of 1d. per gallon for skim and ½d. per gallon for whey, would probably be well supported. The proteins of skim will largely replace animal proteins, at a fraction of the cost of meat protein. Dried skim is widely used in the baking and confectionery trades, in ice cream and in meat small goods. These markets are unlikely to expand rapidly. The outlet for huge amounts as food can only come from adjustments in world trade and from eastern markets. The proteins in skim milk may be coagulated by lactic acid or rennet, and dried for casein which has outlets in the glue, plastics, textile and leather industries. It would seem desirable for a thorough investigation to be made of the possible products which could be prepared from both the milk sugar and the proteins. One possible product is lactic acid which is of increasing importance in many industries.

Since whey has lost both its fat and protein, it is of lesser value than skim except as a source of milk sugar. Since it is a factory by-product, processing costs would not include transport. It may be processed to give lactose, whey paste and dried whey. New Zealand Dairy Products supplied 30% of the world's pre-war lactose market from one small area in Southland and is erecting a factory in Taranaki to raise the figure to 50%. If new uses for lactose can be found, New Zealand, with its intensive cheese producing areas and its stable volume of production would be in a favourable position to process the bulk of the whey for lactose.

Dr. Burns briefly reviewed the world's food position. Europe and North America, with one quarter of the world's population, produce 56% of its food and import much more. Asia, with 53% of the population produce only 17% of the food, though this amount contain 37% of the energy foods such as fats, oils, cereals and sugar. Asia and Africa, by their production of high energy foods, have suceeded fairly well in protecting themselves against starvation, except in years of crop failure, but not against malnutrition and deficiency diseases. They are particularly short of protective foods and high protein foods. New Zealand has an annual commitment

to UNRRA of £2.6 million, of which nearly £2½ million is to be supplied in goods and services. This item is of interest in that our dairy by-products could be used to supplement the diet of the Eastern peoples.

Finally reviewing the world's markets in relation to the products he had discussed, the speaker said that the by-products of the arable and horticultural industries would need to find internal markets. Increased production of casein would seem to depend on a local plastics moulding industry and the restoration of trade with overseas plastics operators. Since lactose is an essential component of the media for penicillin production, world requirements must expand. There should be a potential market overseas for dried whey as stock feed, though it would have to compete with concentrates from the processing of tropical seeds nuts and fruits. Skim milk powder may find a market in the backwood countries of Asia, especially if the real incomes of the people can be raised through industrialisation.

It should be stressed that New Zealand can produce dairy products more cheaply than any other country and production is becoming more efficient. Despite the handicaps of collection costs, small factories and high capital cost of processing plants, it should be possible to process dairy by-products in competition with other countries.

Professor J. Packer and Dr. R. J. McIroy have been elected to the Fellowship of the R.I.C. Dr. McIlroy has also been granted the status of Senior Lecturer at Canterbury College.

OTAGO BRANCH.

At the June meeting of the Otago Branch, Mr. O. H. Keys spoke on the Medical Advertisements Act. Mr. Keys traced the use of the present New Zealand legislation, compared it with legislation overseas, illustrated how it worked, and finally commented on its faults.

In 1904 an Order-in-Council was gazetted requiring that the contents of all patent medicines sold in New Zealand be shown on the labels. In response to threats from overseas manufacturers, the order was revoked the day before it was to have come into force. Sir Joseph Ward assured Parliament that "no maker of a bonafide honest, or even useless drug need have the slightest fear of interference." In 1908 came the New Zealand Sale of Food and Drugs Act and the Quackery Act. In 1941 the Institute took up the quackery of medical advertisements and the 1942 Medical Advertisements Act resulted.

The regulations and the Act are comprehensive. Manu-

facturers must reveal the identity of the proprietor and the place of business. Testimonials, which may not be paid for, must be produced on demand. Nothing in the Act is to apply to anything distributed to the pharmaceutical or medical professions, or published only in their journals. A Board set up under the Act may require any proprietor to prove any claim stated or implied c.f. the "Cease and Desist" order of the American Federal Trade Commission. There is a schedule of diseases in respect for which it is forbidden to advertise. Wide as these powers are, they are not as drastic as those that have long existed overseas. In U.S.A.. for example, goods may be seized in transit. Should they prove untrue to label they may be destroyed, or purified and sold by the State.

Finally Mr. Keys indicated the weaknesses of the Act in practice. The Board is a judicial body; hence whoever approaches it must first prove the falsity of an advertisement complained of. The approach would be easier, and the work of the Board simplified if the composition of proprietary medicines were disclosed on the label as in Great Britain and certain other countries.

At the July meeting of the Otago Branch Prof. J. Packer spoke on "The Chemistry of Long Chain Molecules." Confining himself to unbranched chains with no cross links, Prof. Packer dealt with the subject from the viewpoint of kinetics, physical methods and classical organic chemistry.

The formation of long chain molecules may be classed as polyreactions with one, or more than one, chemical process. The first type is either a poly condensation or an addition polymerization. In the second type there is generally an initiation reaction, a propagation process and a cessation process. The cessation may be due to ring formation, isomerization or collisions.

Whether a compound will be crystalline or non-crystalline depends on the nature of the chain. If a chain with projecting groups is pulled out and then released, it will take up a random shape—it is elastic. In contrast a long chain polyamide when pulled out and released, while returning to shorter length, still retains some arrangement. When cold nylon is pulled out and released, it stays stretched. Its internal crystallization changes to permanent intra-chain crystallization. The two factors concerned are ease of packing and chemical attraction. It is then obvious that the crystalline and non-crystalline states are merely the limits. Prof. Packer applied these ideas to the chemistry of natural and synthetic rubber and polyvinyl compounds. In isoprene derivatives if the compound is wholly trans, it is crystalline; if it is mixed cis and trans, it is amor-

phous. Control of the cis-trans ratio in synthetic rubbers would do much to control the nature of the product. Classical organic methods help solve such problems as nature of union (e.g. head to tail), and of end groups, and the order of polymerization in co-polymers. Evidence for head to tail union is obtained from reaction products, e.g. conversion of the polymethyl-ketoxime with alcoholic HCl to a polyridine system; and an oxygen loss in agreement with that expected were the original union head to tail.

Finally Prof. Packer showed how physical properties of cellulose derivatives depend on molecular factors e.g. how solubility is influenced by rigidity of the chains and magnitude of the binding forces; how the group size affects tensile strength; how melting and softening points pass through a minimum; and how increasing chain length deceases solubility and increases melting points.

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

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